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University of Maine.

Maine Agricultural Experiment Station

ORONO

BULLETIN No. 202. JULY, 1912.

APHID PESTS OF MAINE.
FOOD PLANTS OF THE APHIDS.
PSYLLID NOTES.

This bulletin contains a descriptive account of troublesome Maine aphids infesting Conifers and certain other plants, accompanied by a list of aphids recorded elsewhere on the corresponding plants and also some miscellaneous notes on American psyllids. Several new species are described.

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ORONO, MAINE.

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APHID PESTS OF MAINE.*

EDITH M. PATCH.

There are possibilities of control of certain species of plant lice or aphids by such methods as rotation of crops or the destruction of weeds which serve to maintain a species of aphids dangerous to neighboring crops; or the selection by the landscape gardener of ornamental shrubs and trees which are not susceptible to attacks of aphids common on native vegetation. In some cases circumventing the aphid by means of a knowledge of its food habits and migrations would be simpler and more effective than the direct methods of spraying which need to be repeated each year of attack.

The ornamental cut leaf maple, for example, can be made immune from attacks of the woolly aphid common on the leaves of this tree, by the destruction of neighboring alders on which the migrants develop, and infestations of some *Chermes* galls so troublesome to ornamental spruces could be escaped by omitting the alternate host from the immediate landscape.

But before advantage can be taken of these methods it is necessary to know the full food plant cycle. It happens of course that many species inhabiting plants of no economic value in themselves may be a distinct form of a species very injurious to a more valuable plant, and an economic review of even a local fauna can not omit the species from any native growth.

The importance of securing authentic food plant records for the large family of insects under consideration is emphasized by the fact that some species feed exclusively on a single or a few closely allied plants while other have so wide a range that it requires the collections of many years to include them all.

The reason for treating a local list of aphids with a view of the botanical sequence of the plants they infest is thus apparent enough and needs no other explanation for the arrangement of the present paper. As a convenient bibliography, which at the same time throws into comparison collections from the same and related plants from other parts of the world, there is appended a host plant catalogue of the aphids of the world covering the corresponding group of plants.

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* Papers from the Maine Agricultural Experiment Station: Entomology No. 53.

The plant lice included in this paper are those infesting the Ferns, Conifers, and Monocotyledons.

FERNS.

But one species on ferns has as yet been chanced upon in the Maine collection and that is *Mastopoda pteridis* Oestlund, a peculiar species with atrophied tarsi taken on brake fern (*Pteris aquilina* L.) Aug. 6, 1906, near Orono. An account of this collection is given in Bulletin No. 182 of this Station.

CONIFERS.

Several genera of aphids occur upon Conifers in Maine and all are of economic importance. Of these *Mindarus abietinus* Koch is very troublesome upon the new tender growth of spruce and balsam fir in the spring of the year, producing a ruffled appearance of the needles on infested twigs. Accounts of this species are given in Bulletins 182 and 187.

Seven species of *Chermes* are injurious to spruces, pines and larches in Maine. *Chermes pinicorticis* Fitch has been dubbed "Pine blight" by virtue of the white secretions of a colony on the bark of infested pine, and is a serious enemy to young white pines both in nursery stock and in the open. *Chermes pinifoliae* Fitch (*abieticolens* Thomas) causes a cone shaped gall on black spruce, the migrants from which seek the white pine and deposit eggs upon the leaves so that the nymphs have the tender new growth of white pine to feed upon. They can be detected by the sickened appearance of the pine shoots and the flocculent secretion of the young *Chermes* when numerous. *Chermes abietis* Cholodkovsky inhabits the "pine-apple gall" of white and Norway spruces and is a common nuisance wherever these trees are used for ornamental purposes, for the affected branches become stunted and deformed. *Chermes lariciatus* Patch produces a "pine-apple gall" on white spruce very much like that of *abietis* though the needles are shorter and the gall has a general russet color. The migrants from this gall fly to the larch to deposit eggs and the young develop upon the larch. *Chermes consolidatus* Patch produces small pale pink or green galls on black spruce the migrants from which seek the larch as an alternate host. *Chermes floccus* Patch develops in galls on black and red spruce and migrates to the needles of the white pine to oviposit. Its food plants are thus the same as those of *pinifoliae* but both the galls and the insects are too distinct to be in any respect confused. *Chermes similis* Gillette, first described in Colorado, is found commonly on twigs of Norway, black, red, and white spruces in Maine, the infestation causing a scraggly appearance of the twig rather than a well defined gall. All these species are discussed and figured in Bulletin No. 173 of this Station.

There was also a collection of *Chermes* (No. 111-09) taken on fir (*A. balsamea* Mill) the trunk of which was covered with flocculent patches like those of *pinicorticis* on white pine. The collection comprised apterous females and their eggs and newly hatched nymphs, no winged forms being found.

The third group of coniferous aphids has not been previously worked up for Maine. These belong to the genus *Lachnus* and allied genera. To *Lachnus* belong the giants of the Maine aphids and the colonies are frequently exceedingly abundant at Orono. In June 1904 a whole hillside was covered with honeydew, the ground and the vegetation on it being sticky from the liquid dropped by *Lachnus* colonies feeding above. Much of this sweet liquid crystalized into whitish sugar so that the rocks in some places looked frosted. It was impossible to touch a branch without being heavily spattered with a shower of honeydew. Although these aphids have not been so plentiful any year since, they have been present each season on pine, larch, fir and the spruces.

Lachnus curvipes n. sp. Nos. 31-05; 92-08; 69-10. On *Abies balsamea* Mill. This distinctive species appears to be a not uncommon insect on the balsam fir in the vicinity of Orono.

Apterous oviparous female. Head dark brown or blackish. Antennæ yellowish brown hirsute. Prothorax black. Thorax black and slightly pulverulent. Legs with femora yellowish brown, tibiæ yellowish brown and distal tip black, tarsi black. 1st tibia straight and about 1.9 mm. long, 2nd tibia straight and about 2.25 mm long, 3rd tibia conspicuously bowed and about

4.2 mm long. Tarsus with first joint elongate (0.15 mm at longest dimension) subequal to half of second joint (0.15 mm) and claws measuring about 0.1 mm. Abdomen black, hirsute, and caudad of cornicles with short heavy white flocculency. Cornicles black and tuberculate.

This large form in life is conspicuous on account of the contrast of the dull black abdomen cephalad the cornicles and the flocculency, thick but not long, caudad the cornicles. They rest on four front legs and when disturbed wave the long bowed hind pair around in the air. They were abundant on branches of *Abies balsamea* Mill at Orono, Sept. 26, 1908 at which date many were in copulation. Specimens in the insectary deposited eggs on fir needles. The eggs are elongate, dark but covered with white pulverulency which gives them a gray appearance. They have a slight concavity on the side applied to the leaf.

Alate male. Head black, slightly pulverulent. Antennæ I, II, black; base of III pale, tip dusky; IV, V, VI dusky. III, IV, V and VI tuberculate with very numerous sensoria. Fig. 270. III 0.55 mm; IV 0.3 mm; V 0.425 mm; VI 0.225 mm. Total antennal length about 1.85 mm. Beak about 2.3 mm extending sometimes beyond caudal tip of abdomen. Prothorax and thorax black, slightly pulverulent. Wing 4.2 mm long. M and branches of M all very slender and delicate; the other three veins are very dark and heavy, stigma dense and dark. (Figs. 300 and 301) Legs with yellowish brown femora; tibiæ yellow at base, rest black; tarsi black, first joint elongate and subequal (at longest dimension) to half the second. Fig. 271. Abdomen black and slightly pulverulent, cornicles black and tuberculate. This form in life has a humpbacked appearance due to large thorax and relatively slender curving abdomen with convex dorsum and concave venter.

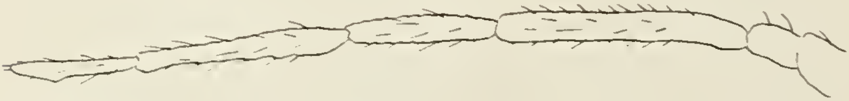
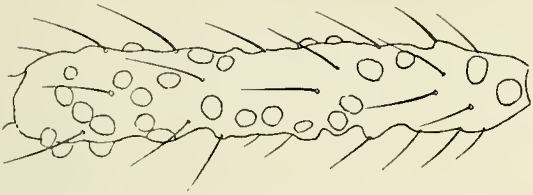


Fig. 269. *L. curvipes.* Antenna of male, showing relative length of joints.



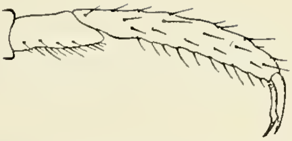


Fig. 270. Antennal joint IV of male, showing sensoria. Fig. 271 Tarsus of male.

Alate viviparous female. This form, together with nymphs, was collected at Orono, July 20, 1905, from *Abies balsamea.* The antennæ is about 2.15 mm total length; III 0.9 mm; IV 0.325 mm; V 0.45 mm; VI 0.25 mm. III with about 10 large sensoria; IV with 3 sensoria in a row; V with terminal sensorium and one other; VI with large sensoria in a group. The beak is about 2.53 mm long. The wing (Fig. 299) is about 5.75 mm long. The veins are heavy except M and branches which is very delicate as in the male.

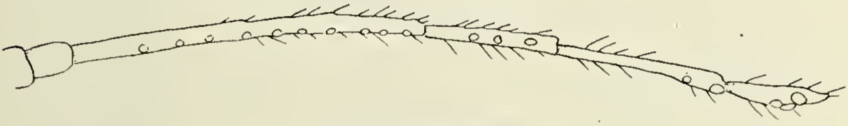
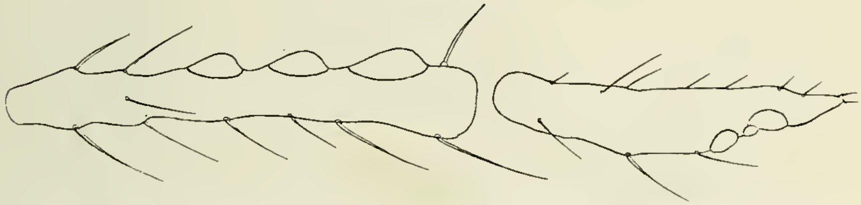


Fig. 272.



Figs. 272, 273 and 274. *L. curvipes.*. Antenna of alate viviparous female; and joints III and VI greatly enlarged.

Apterous viviparous female. A large colony of this form and nymphs was found on a young balsam fir about 1 1-2 inches in diameter. The size of the tree is given because this colony, unlike the others of this species collected at Orono, was on the trunk of the young tree one foot from the ground instead of the branches. The mature forms were dull black with dark reddish femora and black tibiæ. The newly dropped nymphs were pale red.

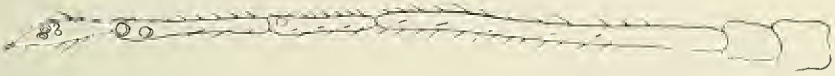


Fig. 275. *L. curvipes.* Antenna of apterous viviparous female.

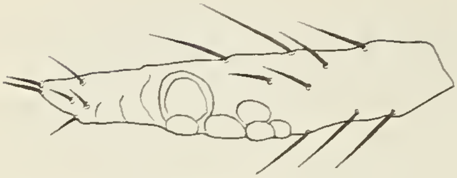


Fig. 276. Antennal joint VI of foregoing figure.

Lachnus laricifex Fitch. What is apparently this species of Fitch's is not uncommon on the larch (*L. laricina* Koch) in Maine. Packard (1890) quotes the original description and records scattered individuals from Augusta, Maine. No figures have been published for this larch aphid in America. Cholodkovsky (1899), however, figures a larch species, *maculosus* Cholodkovsky which is certainly closely allied to the Maine material and may perhaps be the same.

Apterous viviparous female. Head dark brown. Beak extends to about the middle of abdomen. Antennal total length about 1.3 mm. III 0.46 mm; IV 0.2 mm; V 0.26 mm; VI 0.17 mm; IV with one large circular sensorium at distal end; V with usual terminal sensorium and one other large circular sensorium near it; VI with group of sensoria. Prothorax and thorax dark brown with black markings. Head and thorax with white pulverulency both dorsally and ventrally. Femora dark, tibiæ pale proximal end, distal dark; hind tibia slightly bowed; tarsi black. Tarsus with first joint elongate and subequal (at longest dimension) to half the second joint; hind tarsus including claw about 0.5 mm; first joint 0.15 mm; second exclusive of claw 0.32 mm. Abdomen sparsely hirsute, dark brown and slightly pulverulent; there is a pale mid dorsal line, and the dorsum is decorated with black spots and dots, and dark transverse markings, cornicles dark. This form and nymphs common along small twigs and on leaf tufts of larch.

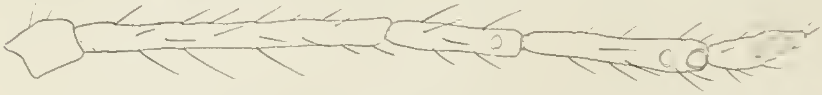


Fig. 277. *L. laricifex.* Antenna of apterous viviparous female.

Alate viviparous female. I have no color description of the winged form but the bodies in balsam accord with those of the apterous female. The wing is better characterized by the photograph, (Figs. 306 and 307), than by a description. The antennal measurements are.—I, 0.1 mm; II, 0.125 mm; III, 0.5 mm; IV, 0.225 mm; V, 0.29 mm; VI, 1.5 mm. III has a row of about 9 sensoria, IV has one near distal end, V has one besides the usual distal sensorium. (Fig. 278). Collection numbers 42-04; 9-05; 32-05; 3-08; 28-08; 27-09; 91-09; 55-10.

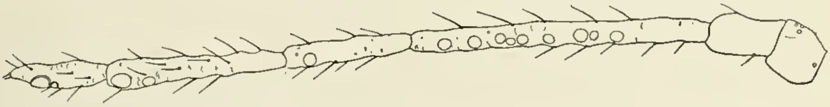


Fig. 278. *L. laricifex.* Antenna of alate viviparous female.

I have no authority for calling this species *laricifex* except that there is nothing in the description of Fitch or others to preclude its identity with that species, and the habitat and what habits are recorded for *laricifex* agree with this Maine species. There is, so far as I know, no authentic specimen of *laricifex* for comparison. This species is not so strongly hirsute as *curvipes,* and the hind tibia is relatively shorter and but weakly bowed. The tarsi of these two species are much alike.

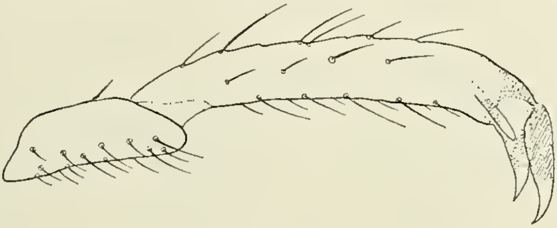


Fig. 279. *L. laricifex.* Tarsus.

Lachnus hyalinus Koch. A *Lachnus* common on Norway Spruce (*Picea abies*) is apparently *hyalinus* Koch. It falls to that species in the key of Cholodkovsky (1898, p. 48 (650)) and the most striking characters,—long fine hairs of entire body, the unusual flocculence of entire dorsum, and the double row of dark dorsal "dots" on abdomen of the Maine species are in accord with the descriptions of Koch, Buckton (for *macrocephalus*) and Cholodkovsky (1898). The Maine records for this species are given below.

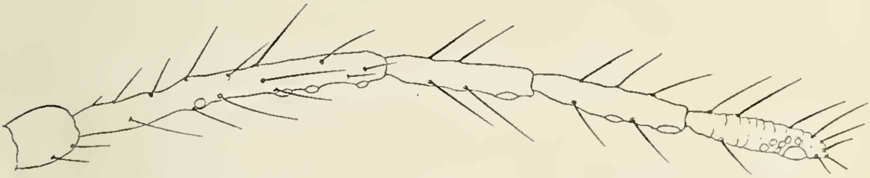


Fig. 280. *L. hyalinus.* Antenna of alate viviparous female.

Alate viviparous female. Head and thorax cinnamon brown. Dorsal lobes of thorax and ventral plate dark brown or black. Antennæ hirsute with segments measuring—I, 0.06 mm; II, 0.075 mm; III, 0.39 mm; IV, 0.16 mm; V, 0.2 mm; VI, 0.16 mm. III with about 4 sensoria in a row; IV with distal sensorium; V with 1 sensorium besides the usual distal one. (Fig. 280). Wings as shown in (Figs. 308 and 309). Legs hirsute. Tarsus with 1st joint not elongate, the longest dimension being 0.075 mm and 2nd joint exclusive of claw 0.36 mm. (Fig. 281). Abdomen hirsute, light brown,—paler than head and thorax. Cornicles tuberculate dark brown with varnished appearance. Body of recently molted individual is very densely flocculent being covered with white "wool" from head to tip of abdomen. The costal edge of the deflexed wings part this white substance on the abdomen so that there is a mid dorsal row of wool and two lateral rows, giving the body a three striped appearance. The flocculent matter rubs off from the older individuals so that they appear merely pulverulent. These were found on tender new growth of twig of *Picea abies* thickly packed among the new needles. This alate form was taken June 20, 1910; June 28, 1909; and July 12, 1906. *The pupa* is pulverulent and pale brown like the abdomen of the winged viviparous females. Cornicles darker than rest of abdomen. On dorsal abdomen 6 double rows of dark dots, (i. e. the wax pore plates), the 5th row being on a line with the cornicles.

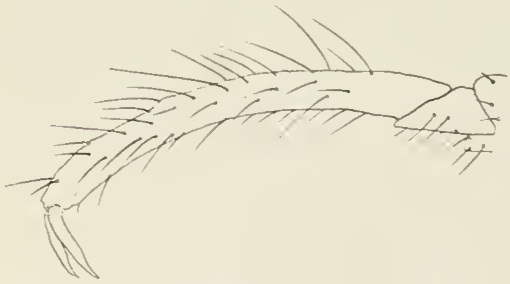


Fig. 281 *L. hyalinus.* Tarsus of alate viviparous female.

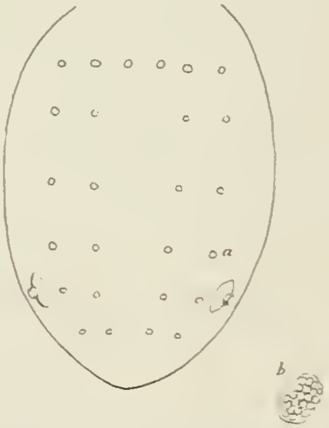


Fig. 282. *L. hyalinus.* Abdomen of apterous viviparous female, with wax-pore plates indicated.

Apterous viviparous female. Head and prothorax and abdomen medium brown, thorax and abdomen paler brown. Legs, antennæ and entire body hirsute. Abdomen pulverulent, and with longitudinal row of 2 black spots per segment on each side of dorso-mesal area, and two extra median ones on 1st abdominal segment. These are the wax-pore plates. See Fig. 282, *b* being an enlargement of area *a*. Cornicles dark brown. These are found thickly packed in new growth with beaks in twig of *Picea abies*. Collection Nos.—71-06; 36-09; 33-10. A small collection (33-11) of the same species was taken from *Picea canadensis* July 22, 1911.

Lachnus strobi Fitch. Since 1904 numerous collections of this species have been made in the vicinity of Orono where it is very common on the white pine. Weed (1890) describes and figures the true sexes of *strobi*. The following account will give the substance of the Maine records.

Apterous viviparous female. Entire body greenish black. Antennal measurements as follows: I, 0.08 mm; II, 0.06 mm; III, 0.32 mm; IV, 0.13 mm; V, 0.175 mm; VI, 0.16 mm. Except for a sensorium on V there are no sensoria on antenna other than the usual distal ones of V and VII. (Fig 283). Eyes prominent. Beak extends nearly to middle of the abdomen. Abdomen hirsute (hairs stiff), pulverulent on ventral surface. Cornicles black. The abdomen globular and glistening and bronzy.

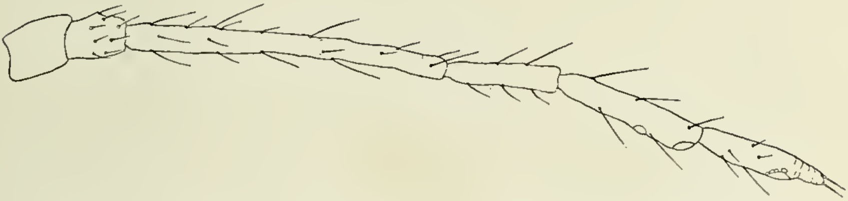


Fig. 283. *Lachnus strobi.* Antenna of apterous viviparous female.

Alate viviparous female. A dark brown nearly black *Lachnus* with a whitish pulverulency on ventral surface and a median whitish line, extending from front of head to cauda, which is interrupted in region of cornicles. The cornicles are black and situated in a black patch with a cephalad and caudad margin of white spots which are conspicuous. The white median line is sometimes broken into spots on the abdomen and sometimes rubbed off. The antennal measurements are I, 0.08 mm; II, 0.06 mm; III, 0.46 mm; IV, 0.17 mm; V, 0.2 mm; VI, 0.17 mm. III with about 10 sensoria in a row; IV with 2 sensoria; V with 1 besides the usual distal one. Fig. 284. The thoracic lobes are black. The wings with M very delicate and characterized as in Figs. 302 and 303. *Pupa* has same color markings as the alate female.

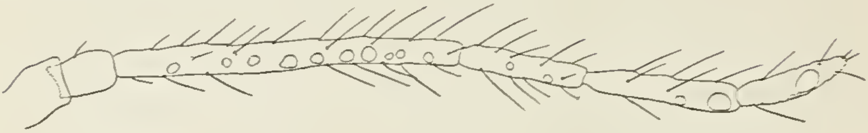


Fig. 284. *L. strobi.* Antenna of alate viviparous female.

The eggs of Lachnus strobi are very common on the white pine needles, where they occur in shining black rows. Those observed in 1908 hatched about the middle of May. Different collections of this species have contained individuals which varied much in size but the antennal measurements given will indicate relative proportions. Hairs of antennæ and legs are stiff.

Lachnus pini Weed. The oviparous female of a *Lachnus* on Scotch Pine was described and figured by Weed (1890) as *Lachnus pini* L. The apterous and alate viviparous females of apparently the same species is common on Scotch Pine about Orono. This species seems in accord with *Lachnus pineti* Koch as discussed and figured by Cholodkovsky (1898) and may prove to be that cosmopolitan species. For the present it seems sufficient to link it with the records given by Weed. Following is an account of the material taken in Maine.

Apterous viviparous female. Head, thorax and abdomen of about uniform color, varying shades of brown according to length of time from molt. Dorsal and lateral head, thorax and abdomen finely peppered with black dots. The whole insect covered with tawny hair. The antennæ with III pale, IV, V, VI darker to black. Measurements III, 0.625 mm; IV, 0.25 mm; V, 0.4 mm; VI, 0.23 mm. There are no sensoria except the usual distal ones of V and VI. The beak extends to middle of abdomen.

The abdomen is hirsute, sometimes cinnamon brown, sometimes reddish brown with a white pulverulency that gives a pinkish cast. There is less pulverulency at the caudal half and it is most conspicuous along the mid dorsal area. There are two longitudinal stripes of dark greenish bronze which sometimes appear as longitudinal rows of dark bronze green patches along the margin of the whitened mid dorsal area. The abdomens of the older individuals have very bronzy reflections. The cornicles are varnished brown in color. The cauda is ringed at base with black. This collection (47-09) was made June 30, 1909. The empty shells of the winter eggs from which they had hatched were still attached to the needles of the Scotch Pine. (*P. sylvestris*).

The newly dropped nymph is bright pale yellow on head and thorax and brownish yellow on abdomen. Antennæ and legs are pellucid white with yellow joints.

Alate viviparous female. This form was collected June 30, 1909, and June 20, 1910. In coloration they resemble the apterous form. The wings are shown in Figs. 304 and 305. The pulverulent dorso-mesal area is whiter and often appears as transverse bands of white. The antennal measurements are I, 0.1 mm; II, 0.1 mm; III, 0.55 mm; IV, 0.3 mm; V, 0.35 mm; VI, 0.225 mm. III has about 7 sensoria in a row. IV, 1 sensorium, V, 1 besides the usual distal one. Fig. 285.

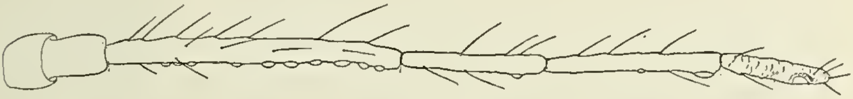


Fig. 285. *L. pini.* Antenna of alate viviparous female.

Essigella californicus Essig. An alert linear little species was taken from *Pinus strobus* June 30, 1909, at Stillwater, Maine (46-09). Mr. Essig's description of *californicus* which was received about that time showed so many resemblances to the Maine collection that Mr. Essig kindly sent me a good collection from California. The Maine material accords with that sent me from California.

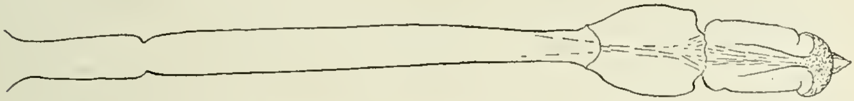


Fig. 286. *E. californicus.* Beak.

Winged viviparous form. Only one individual of this sort was obtained. Head light greenish brown with I and II of antennæ concolorous. III, IV, and V were each pale at proximal and dark at distal part. The antenna with but five joints and as figured by Essig. Eyes very red. Beak extends to caudal edge of dark brown heart-shaped plate of ventral thorax. Prothorax light greenish brown. Thorax green with lobes brown, and ventral plate dark brown, heart-shaped. Abdomen light but vivid green and thickly speckled with fine dark dots. This specimen was bred from pupal nymph collected June 30.

Pupa green with antennæ and legs with dusky tips. Antennæ with 5 joints, green at base but dusky over the rest. Beak extends to 3rd coxa. About 12 transverse rows of fine dots on abdomen arranged as follows: Alternate rows of 8 dots, the 2 lateral ones largest and alternate rows of 4 subequal dots.

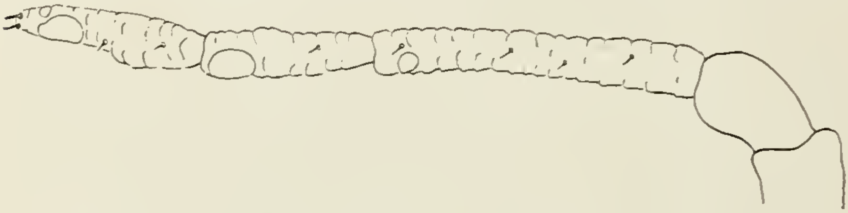


Fig. 287. *E. californicus.* Antenna of apterous viviparous female.

Apterous viviparous female. Color about as in pupa. Beak reaches 1st abdominal segment. The beak of apterous and alate forms is the same characteristic shape, shown in figure 286. The antennæ 5-jointed and usually with no sensoria, except the usual distal ones on the last and next to last joints. There was one exception in which III had a single large distal sensorium as shown in Fig. 287. The bases of the setal hairs on III and other segments frequently very distinct.

The eyes of the embryos are very red and give the abdomen of the viviparous forms a red spotted appearance.

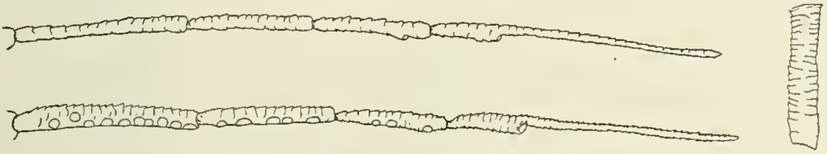
MONOCOTYLEDONS.

The species of aphids infesting the monocotyledonous plants of Maine include several widely distributed pests, among which are the especially troublesome European Grain Louse migrating from grains to apple, the corn leaf aphis, and the practically omnivorous *Myzus persicae*. Others no less interesting though of less economic significance occur as is recorded in the following discussion.

Aphis abbreviata n. sp. Some leaves of water plantain which were brought in for the sake of a large colony of *Rhopalosiphum nymphae* proved to be colonized also by a little pale green Aphis.

Alate viviparous female. Head and thorax black. Abdomen green. Antenna imbricated; III with from 8 to 12 large circular sensoria extending along the whole length. IV with 3 to 6 sensoria in a row, V with 2 or fewer sensoria besides the terminal one. Antennal total length about 1 mm; III, 0.22; IV, 0.175 mm; V, 0.125; VI, base 0.1 mm; spur, 0.25 mm. Prothoracic tubercles present. Wing about 2 mm long. Fig. 311. Cornicle imbricated, 0.2 mm; tarsus, 0.075 mm; cauda, 0.19 mm. Total body length about 1.25 mm. Figs. 289 and 290.

Apterous viviparous female. A pale green form. Antennæ imbricated. No sensoria except usual terminal ones of V and VI. Total antennal length about 1 mm. III, 0.2 mm; IV, 0.15 mm; V, 0.15 mm; VI base, 0.1 mm; spur, 0.26 mm. Fig. 288.



Figs. 288, 289, 290. *A. abbreviata.*

The pupæ of this collection were pale green with pale brown wing pads. The nymphs were pale green.

Cotypes collected on *Alisma Plantago-aquatica.* Sept. 14, 1910, at Orono, Maine, by W. C. Woods. No. 123-10.

Rhopalosiphum nymphaeae Linn. Several collections of this semi-aquatic species have been made at Orono from *Alisma Plantago-aquatica* by W. C. Woods. On July 14, 1909, No. 66-09 collection comprised apterous viviparous females, nymphs and pupæ from ventral leaf and crowded along blossom stalk. The big apterous viviparous females had very globular abdomens, dark olive green and mottled with greenish black. The collection 95-09 made July 20, 1909 contained alate as well as apterous viviparous females. Collection 122-10 taken Sept. 14, 1910, comprised alate and apterous viviparous females, nymphs and pupæ. These were all dark brownish green, the pupæ and apterous forms having a conspicuous white pulverulent bloom on ventral thorax. The alate viviparous form of this collection had a total body length of 2 mm and a wing 3.25 mm long, the cornicle was 0.425 mm long and the tarsus 0.150 mm. The cornicle (Fig. 291) is gently incrassate and the sparse and narrow imbrications have a fine saw-toothed edge. The prothoracic tubercle is distinct and two pairs of abdominal tubercles can be found as shown by Jackson (1908). The imbricated antenna of the alate viviparous female (Fig. 292) has a total length of about 1.75 mm. III is 0.4 mm with 17 more or less distinct but not very large sensoria. IV is 0.275 mm with 1 to 3 sensoria. V, 0.25 mm with usually no sensoria except the terminal one. For wing see Fig. 315.

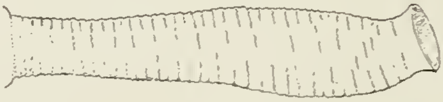


Fig. 291.

These Maine collections of this species accord for the most part with Jackson's drawings and account of *Aphis aquaticus* Jackson except that they run a little larger.

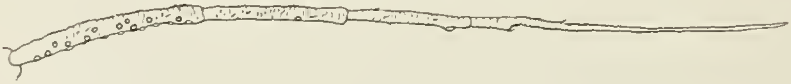


Fig. 292. *R. nymphaeae.* Antenna of alate viviparous female.

Siphocoryne avenae (Fab.) The European Grain Louse was abundant in the Station Insectary upon oats and barley the winter of 1909-1910. No. 1-10 was an Insectary collection, Jan. 5, 1910, comprising apterous and alate viviparous females and pupæ. This species also occurs in the apple in Maine. Fig. 310 gives a photograph of the wing. Sanderson (1901b 13th Ann. Rept. Delaware Col. Agr. Exp. Sta.) and Pergande (1904a Bul. 44 Div. of Ent., U. S. Dept. of Agr.) give figures, descriptions and discussions of this species which characterize it so well that further description is unnecessary here.

Collection 120-10 from leaf blades of cultivated corn at Orono, Maine, Sept. 14, 1910, comprised apterous and alate viviparous females, nymphs and pupæ of this species. *Avenae* has sometimes considerably affected the wheat crops of Illinois, Minnesota and other wheat growing localities. It has been considered in Canada one of the chief insect enemies of the wheat. Concerning the habits of this species Thomas in his Third Report (1879 p. 53) says "When the winter wheat appears above the ground in the fall, it passes from its hiding place at this time, wherever that may be, probably in the same way that it does from the winter wheat to the spring wheat and oats in the spring, that is by the winged individuals.

"Here they work upon the leaves and stalks singly, while the weather is not too cold, but when winter appears they move down towards the ground, some of them at least, entering the soil and feeding upon the sap of the roots. At any rate, I find the apterous ones at this time working upon the roots, but at the same time I find a winged individual above ground. I have also observed them heretofore at the root of the wheat, late in the winter, while snow was on the ground; and what somewhat surprised me, I found them busy at work under the snow, and the apterous females bearing well formed larvæ. I am, therefore, led to believe that in this latitude the species passes the winter in other than the egg state. This will also, probably, be found true wherever winter wheat is grown."

Aphis maidis Fitch. A badly infested lot of blades were sent to the Station from Cumberland Mills, Maine, Sept. 7, 1908, with the comment that the aphids were covering "every stalk of Kaffir, Broom Corn and Sugar Cane. Very few on other corn." This collection (75-08) comprised both apterous and alate viviparous females and nymphs on Sugar Cane (*Saccharum officinarum*).

A large collection (107-06) of this corn leaf aphis was made at Orono from field corn (*Zea Mays*) Aug. 30, 1906. Concerning this species Mr. Davis (Tech. Ser. No. 12, Part VIII, Bur. of Ent. p. 140) states "*Aphis maidis* has always been considered more or less injurious to corn, sorghum, and broom corn, although it seldom becomes seriously so. In some cases, however, it injures the corn ears by sucking the sap from the silk and killing it, thus preventing fertilization of the kernels. Only rarely, however, does it stunt the growth of the plant, at least in Illinois, the reason probably being that in this State the aphid does not commence its attacks upon the plant until the last part of June or the first of July, at which time the plant is strong enough to withstand the drain made upon its sap supply by the aphis. This aphis sometimes does considerable injury to the quality of the brush of broom corn by discoloring it, the discoloration being 'due to a bacterial affection following upon the plant-louse punctures' (Forbes).

"This aphis has a very wide distribution, being found in all parts of the United States where corn is grown; that is, from Maine to California and Texas. Prof. F. M. Webster has reported finding it on sorghum in Australia, where, he says, it is sometimes quite obnoxious, and in a recent circular he says that 'the insect is also known from Japan.'"

Myzus persicae Sulzer. On Dec. 6, 1911. a chrysanthemum heavily infested with this species of aphid was brought into the Station Insectary. Migrants from this colonized both young apple trees and sweet corn, abundantly accepting both for the winter months. This species has been so admirably figured by Miss Palmer (Gillette and Taylor 1908) that the Maine collections need no further illustrations for identification. Probably no aphid has a wider range of food plants than *persicae* and it is often a very serious pest.

Sipha glyceriae (Kaltenbach) Pass. The collection (29-08) of this remarkable aphid on rushes. *Juncus* sp., in Maine has been figured and discussed previously in Bulletin No. 182 of this Station.

Neoprociphilus attenuatus (Osborn and Sirrine). A collection (58-05) from *Smilax herbacea* made at Levant. Maine. Aug. 26, 1905, comprised winged and apterous viviparous females, nymphs and apterous oviparous females. This material was determined by Mr. Pergande as *Pemphigus attenuatus* and accords with the general account given by Osborn and Sirrine (1893). There are discrepancies in the measurements—that for joint I of the antennæ of the alate viviaprous form should probably read .05 mm instead of .5 mm as printed in Insect Life and quoted by Jackson (1908).

A second collection (121-09) was made from *Smilax* near Orono. Sept. 23. 1909. It is with some misgivings that I erect a genus for this single species. Of the five genera of the Tribe Pemphigina recognized by Tullgren (1909) *attenuatus* falls nearest to *Prociphilus* Koch but the antennal secondary sensoria would exclude it from that genus. I lack at present material suitable for an adequate study of the wax-pores; and the stem-mother from which Tullgren deduces certain generic characters. I have not collected.

The fact that this is the only example of the Pemphigina which has been recorded for the Liliaceae lends strength to a generic separation of the insect and a more detailed study of the species will doubtless show more accurately its affinities and distinctive characters.

Neoprociphilus, new genus. Alate viviparous female with the sensoria of III, IV and V broadly eliptical in shape. VI long with very short spur. Wings extending far beyond the stigma and Rs very long and only slightly curved, M is not branched. Young nymphs with 5-jointed antenna and large wax-pore plates on head, thorax and abdomen. Minute oviparous female beakless and with a 5-jointed antenna. Type: *Pemphigus attenuatus* Osborn and Sirrine.

Neoprociphilus attenuatus. This species appears to be more generalized than other known Pemphigina by virtue of the broadly elliptical sensoria of the antenna.

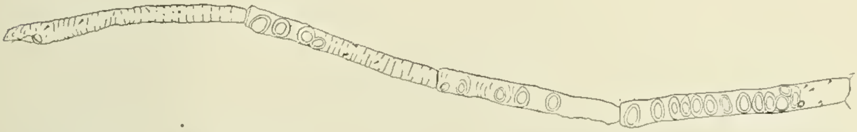


Fig. 293. *Neoprociphilus attenuatus.* Antenna of alate viviparous female.

The alate viviparous female with the antennal joints measuring about: I, 0.15 mm; II, 0.22 mm; III, 0.6 mm; IV, 0.5 mm; V, 0.55 mm; VI, 0.68 mm including spur which extends only about 0.08 mm. III, IV, V and VI being approximately subequal; and II subequal to 1-2 III. III with about 14 large broadly eliptical sensoria in a row on one side of segment and extending the whole length of segment except basal 1-4; IV with 4 or 5 similar sensoria on distal 2-3; V with 4 large sensoria on distal 1-2. V and VI with dentate imbrications. Body length about 3 mm and wing expanse about 10 mm. Wings are shown in Fig. 314.

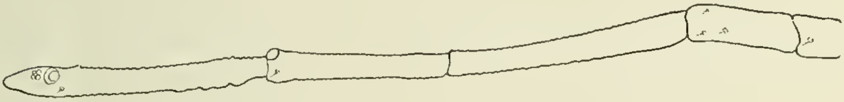


Fig. 294. *N. attenuatus.* Antenna of nymph.

Osborn and Sirrine give brief description of nymphs under caption "Apterous males or larvæ(?)" The stout beak extending nearly to tip of abdomen clearly indicates the nymph rather than one of the true sexes. The young nymphs are linear and well supplied with large wax-pore plates on head, (Fig. 295) thorax and abdomen. They have a 5-jointed antennæ.

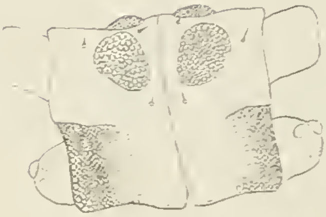


Fig. 295.

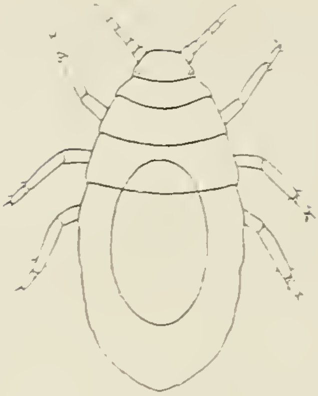


Fig. 296.

Fig. 297.

Oviparous female. This yellowish form is about 1.4 mm in length. It is beakless and the antenna is 5-jointed. Fig. 296.

Apterous viviparous female. Large dark form about 4.6 mm in length, and as woolly as *Pemphigus tessellata.* Antennæ with I subequal to 1-2 II; II subequal to 1-2 III; III, IV, V, VI approximately subequal.

Aphis gladioli Felt. Collection 84a-08 made from stalk of *Gladiolus* Orono, Sept. 15, 1908, comprised alate viviparous females of this species which accords in every detail with named examples of *gladioli* Felt given me by Dr. E. P. Felt.

Concerning the life history of this species Dr. Felt says (24th Report of the New York State Entomologist): "Gladioli bulbs are kept by growers in large ware houses, the temperature being maintained at about 40 degrees throughout the winter. This insect is evidently unable to breed under these conditions. As spring advances and the house begins to warm up in March, the aphids appear in large numbers, reproducing so abundantly that the window frames and sills may become literally covered with wings and bodies of plant lice. It is comparatively easy, in a badly infested house, to sweep up a gill of wings and exuviæ from under one window. This plant louse multiplies freely upon the bulbs, usually being massed around the origin of the roots and sometimes nearly covering the entire under surface. Breeding evidently continues from some time in March until July, with the production of numerous winged individuals the latter part of July, at least in the case of bulbs submitted for examination, though winged females undoubtedly occur earlier in the season under warehouse conditions. By

July 28 winged females had entirely disappeared in our breeding cages, though young were still numerous on the bulbs; later, all disappeared. An investigation about the middle of August resulted in finding no living aphids in the storage warehouse or upon the plants in the field. It is stated that when digging in October a few plant lice may be found upon the bulbs. These evidently remain in a dormant condition till the house warms up in the spring as described above."

Aphis rumicis Linn. Collection 84-08 made from stalk of *Gladiolus* Orono, Sept. 15, 1908, comprised apterous and alate viviparous females and pupæ of this general feeder. It can be distinguished from *gladioli* which is apparently closely allied by the following structural differences. *Rumicis* is a much larger species and the lateral tubercle of prothorax, and first abdominal segment (Fig. 297) and the lateral one between cornicle and cauda, are very large and pronounced, while in *gladioli* these are relatively small though distinct. The cornicle and antennæ of *rumicis* are figured by Gillette (1910, p. 406) and accord in essentials with those from the *Gladiolus* though Fig. 298 is given for the slight variation. It will be noticed that while basal VI of *gladioli* is nearly subequal to V and IV+V are shorter than III, neither being equal to 1-2 III; in *rumicis* basal VI is subequal to 1-2 V and IV+V are longer than III, each being longer than 1-2 III. III and IV in *gladioli* both bear more sensoria than *rumicis*. Figs. 312-313 give the wing of this collection. The following notes on *rumicis* (84-08) from *Gladiolus* are copied from my record sheets:

Alate viviparous female. Head black, antennal measurements—I, 0.1 mm; II, 0.1 mm; III, 0.35 mm; IV, 0.2 mm; V. 0.225 mm; VI, base 0.13 mm; spur, 0.35 mm. III with about 18 large sensoria, IV with 3 or less and V with none except distal one. The prothorax is shiny black with very prominent lateral tubercle. Thorax shiny black, veins of wings dark and slender. Abdomen blackish green with black intersegmental lines, and with irregular large black lateral spots on 2nd, 3rd and 4th segments; 1st with large lateral tubercle like that of prothorax and a similar one between cornicle and cauda. Cornicles black and shaped as in Gillette's figure (1910, p. 406). Cauda black at tip, base greenish brown. Wings are shown in Figs. 312 and 313.

Apterous viviparous female. Head, thorax and abdomen black. Abdomen with white transverse pulverulent dorsal patches,—a pair to each of 3 or 4 segments. Cauda black at tip, brown at base. Cornicles black.

Pupæ. Head and prothorax black,—lateral tubercles present. Thorax pale to dusky. Abdomen black with white pulverulent transverse dorsal patches,—about 3 pairs cephalad cornicles and 2 lines caudad cornicles.

Structurally *Aphis cookii* Essig (Essig 1911c) comes very close to this species.

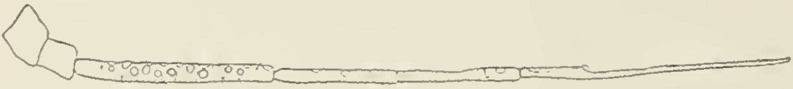


Fig. 298. *A. rumicis.* Antenna of alate viviparous female.

Macrosiphum solanifolii Ashmead. Collection 85-08 taken at Orono, Sept. 5, 1908, from stalk of *Gladiolus* comprised alate and apterous females which I am unable to separate from *solanifolii* from potato and take to be the same species. Collection 20-05 taken from cultivated *Iris* July 6, 1905 contained apterous females and nymphs of this species. Bulletins No. 147 and No. 190 of this Station are devoted to *solanifolii*, a species frequently troublesome in the large potato fields of Maine and in certain localities in Canada.

EXPLANATION OF APHID WING PLATE.

Fig. 299 Lachnus curvipes, alate viviparous female; Figs. 300 and 301, L. curvipes, male; Figs. 302 and 303 L. strobi; Figs. 304 and 305 L. pini; Figs. 306 and 307 L. laricifex; Figs. 308 and 309 L. hyalinus; Fig. 310 Siphocoryne avenæ; Fig. 311 Aphis abbreviata; Figs. 312 and 313 A. rumicis; Fig. 314 Neoprociphilus attenuatus; Fig. 315 Rhopalosiphum nymphæ.

FOOD PLANT CATALOGUE OF THE APHIDAE OF THE WORLD.

PART I.*

(A Bibliographical Appendix to Aphid Pests of Maine.)

EDITH M. PATCH.

This catalogue aims to be a host plant bibliography rather than an Aphid bibliography. It maintains a systematic sequence of the families of host plants, but it is neither systematic nor critical from the aphid standpoint. It does not reflect the opinion of the compiler as to the validity of any aphid species; it merely selects such references as appealed to her as initially desirable in case a given species is to be worked up systematically or monographically. By "initially desirable" is not necessarily meant the best descriptions. In many cases it includes references to these; in many, however, it includes references to apparent contradictions and confused situations.

The synonomies given are those recorded by the publication quoted whether written in 1912 or one hundred years ago, but no attempt has been made to give the complete synomony and the original sources must be consulted for this. It would be a mistake for any one to expect more of this List than a record of what species of aphid have been *reported* on each species of plant with reference to the authority for the statement.—for that is all the List aims to do. Whether either the aphid or the plant is correctly determined or not has been no concern of the compiler. For it is the purpose of the catalogue to reflect the recorded condition of things, to show up the confusion and involved synonymy, and to expose the tangle which must be left to the monographing systematist to clear up.

EUMYCETES.

FUNGUS.

F. sp.

Schizoneura corni Fab. Williams. 1891, p. 11.
Schizoneura fungicola (Walsh). Thomas, 1879, p. 141.
Toxoptera graminum Rondari. Hunter, 1909, p. 103.

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* Papers from the Maine Agricultural Experiment Station: Entomology No. 54.

POLYPODIACEAE. FERN FAMILY.

ACROSTICHUM.

A. reticulatum Kaufl.
Idiopterus nephrelepidis Davis. Essig, 1911b, p. 541.
Macrosiphum kirkaldyi. Fullaway, 1909, p. 23.

ADIANTUM. Maidenhair.

A. pedatum L.
Aphis adianti Oestlund. Oestlund, 1887, p. 66.

CYSTOPTERIS. Bladder Fern.

C. montana (Lam.) Bernh.
Amphorophora ampullata Buckton. Lichtenstein, La Flore.
Rhopalosiphum staphyleae Koch? Buckton, 1, p. 188.

NEPHROLEPIS.

N. exaltata. Sword-fern.
Idiopterus nephrelepidis Davis. Davis, 1909c, p. 199. Essig, 1911b, p. 541.

ONOCLEA.

O. struthiopteris L. Ostrich Fern.
Rhopalosiphum ampullata (Buckton). Oestlund, 1887, p. 77.

PTERIS. Brake.

P. aquilina L. Common Brake.
Aphis (Adactynus) pteris-aquilinoides Rafinesque. Rafinesque, 1817.
Mastopoda pteridis Oestlund. Oestlund, 1887, p. 49.
Mastopoda pteridis Oestlund. Patch, 1910b, p. 246.

MARSILEACEAE.

MARSILEA.

M. quadrifolia L.
Rhopalosiphum nymphaeae (Linn.) Koch (A. butomi Schrank) (R. najadum Koch). Passerini, 1863, p. 21.
M. vestita Hook and Grev.
Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 36.

SALVINIACEAE.

SALVINIA.

S. natans L.
Rhopalosiphum nymphaeae (Linn) Koch (A. butomi Schrank) (R. najadum Koch). Passerini, 1863, p. 21.

PINACEAE. PINE FAMILY.

ABIES. Fir.

A. balsamea Mill. Balsam or Balm-of-Gilead Fir.

Aphrastasia pectinatae (Chol.) CB. (Chermes pectinatae Chol. 1888) (coccineus Chol. 1889 nec. Ratz 1843) (Dreyfusia pectinatae Chol. CB 1907-08). Börner, 1908a, p. 211. Börner, 1909a, p. 502.

Chermes coccineus Chol. Cholodkovsky, 1907, p. 22.

Chermes sp. Patch, 1912c.

Lachnus curvipes Patch. Patch 1912c.

Mindarus abietinus Koch. Nüsslin, 1910, p. 408.

Mindarus abietinus Koch (? Schizoneura obliqua Chol.) Tullgren, 1909, p. 61.

Mindarus abietinus Koch. Patch, 1910b, p. 243.

Pemphigus poschingeri Holzner. Zoölogical Record, 1874, p. 486.

A. concolor Lindl.

Lachnus abietis Fitch. Davidson, 1909, p. 299.

Mindarus abietinus Koch (? Schizoneura obliqua Chol.) Tullgren, 1909, p. 61.

A. fraseri Lindl.

Pemphigus poschingeri Holzner. Zoölogical Record, 1874, p. 486.

A. grandis Lindl.

Lachnus occidentalis Davidson. Davidson, 1909, p. 300.

A. nobilis Lindl.

Chermes piceae Ratz. Cholodkovsky, 1907, p. 27.

Dreyfusia nüsslini CB. (Chermes funitectus Chldk. 1907 nec Dreyfus 1888) (nordmannianae Eckstein 1890) (? obtectus Ratz. 1844) (piceae Nüsslin, and CB 1908). Börner, 1908b, p. 742.

Dreyfusia piceae Ratz. (Chermes piceae Dreyfus 1888, Nüsslin a. p.) (var. bouvieri Chldk 1903). Börner, 1908b, p. 745.

A. Nordmanniana Spach.

Chermes piceae Ratz "provisionally determined." Felt, 1910, p. 343.

Dreyfusia nüsslini CB. (Chermes funitectus Chldk. 1907 nec Dreyfus 1888) (nordmannianae Eckstein 1890) (? obtectus Ratz 1844) (piceae Nüsslin, and CB 1908). Börner, 1908b, p. 742.

Dreyfusia piceae Ratz. (Chermes piceae Dreyfus 1888, Nüsslin a. p.) (var. bouvieri Chldk 1903). Börner, 1908b, p. 745.

Mindarus abietinus Koch. Nüsslin, 1910, p. 408.

A. pectinata DC.

Chermes piceae Ratz. Cholodkovsky, 1907, p. 26.

Dreyfusia nüsslini CB. (Chermes funitectus Chldk. 1907 nec. Dreyfus 1888) (nordmannianae Eckstein 1890) (? obtectus Ratz, 1844). (piceae Nüsslin, and CB, 1908). Börner, 1908b, p. 742.

Dreyfusia piceae Ratz. (Chermes piceae Dreyfus 1888, Nüsslin a. p.) (var. bouvieri Chldk. 1903). Börner. 1908b. p. 745.

Lachnus pichtae Mordwilko. Mordwilko. 1899, p. 407.

A. sibirica Ledeb.

Aphrastasia pectinatae (Chol.) CB (Chermes pectinatae Chol. 1888) (Coccineus Chol. 1889 nec. Ratz 1843) (Dreyfusia pectinatae (Chol) CB. 1907-08). Börner. 1908a, p. 211. Börner. 1909, p. 502.

Chermes coccineus Chol. Cholodkovsky, 1907, p. 22.

Lachnus abieticola Chol. Cholodkovsky. 1899, p. 470.

Mindarus abietinus Koch. Nüsslin, 1910, p. 408.

A. Webbiana Lindl.

Chermes himalayensis Stebbing. (Ch. abietis Buckton Ind. Mus. Not. 3, pp. 5. 54.) (Ch. abietis-piceae Stebbing) Stebbing, 1910, p. 99.

Dreyfusia abietis-piceae Stebbing. Börner, 1908a. p. 211.

A. sp.

Prociphilus bumeliae Schrank. (poschingeri Holzner in part) "auf der Edeltanne." Nüsslin. 1910a. p. 294.

Prociphilus nidificus Löw. (poschingeri Holzner in part) Nüsslin. 1910a, p. 293.

Schizoneura costata Hartig. Hartig, 1841, p. 367. "auf der Rothtanne."

CEDRUS.

C. Libani Barrel. (Larix Cedrus).

Aphis sejuncta Walker. Walker, 1848c. p. 2247.

CRYPTOMERIA.

C. sp.

Lachnus greeni Schouteden. Schouteden, 1905. p. 184.

CUPRESSUS.

C. sempervirens L.

Lachnus cupressi Buckton. Cholodkovsky. 1910. p. 148.

JUNIPERUS. Juniper.

J. communis L. Common Juniper.

Aphis incerta Walker. Walker. 1849c. p. 45.

Aphis indecisa Walker. Walker. 1849c. p. 45.

Lachnus juniperi (Fab.). Buckton. 3. p. 45.

Lachnus juniperi (DeGeer) Kalt. Passerini. 1863. p. 65.

Lachnus juniperinus Mordwilko. Mordwilko. 1899. p. 407.

LARIX. Larch.

L. europaea DC. (L. decidua). (Pinus Larix). (L. communis).

Anisophleba hamadryas Koch. Kaltenbach. 1874. p. 702. and Koch. p. 320.

Aphis laricis Walker. Kaltenbach, 1874, p. 703.
Aphis tenuior Walker. Walker, 1849c, p. 49.
Chermes abietis L. Dreyfus. (geniculatus Ratz. 1843) (lapponicus Chldk. 1889) (laricis Hartig 1837) (pini, piceae Gleditsch 1774) (strobilobius Blochmann 1887) (viridis Chldk. 1895). Börner, 1908a, p. 207.
Chermes laricis Hartig. Buckton 4, p. 34.
Cholodkovskya viridana (Chol.) CB. (Chermes viridanus Chldk. 1896) (? Pineus viridanus CB. 1907-08). Börner, 1909a, p. 499.
? *Cnaphalodes affinis* Börner. Börner, 1908a, p. 211.
Cnaphalodes lapponicus (Chol.) (Chermes). Börner, 1909a, p. 555.
Cnaphalodes strobilobius (Kalt) CB. (laricis Vallot 1836) (hamadryas Koch 1857) (abietis L. 1761) (atratus Buckton 1883) (coccineus Ratz 1843) (geniculatus Ratz 1843) (lapponicus Chldk 1889 var. praecox Chldk. 1894 var. tardus Chldk. 1895) (lariceti Altum 1889) (pini, piceae et abietis Gleditsch 1774) Börner, 1908a, p. 208.
Lachnus maculosus Cholodkovsky. Schouteden, 1906a, p. 204.
Lachnus pinicolus Kalt. Buckton, 3, p. 53.
Pineus (?) *viridanus* (Chldk.) CB. (? orientalis Chldk 1904). Börner 1908a, p. 208.

L. laricina Koch. (americana). American Larch, Tamarack, Hackmatack.
Chermes consolidatus Patch. Patch, 1909d, p. 307.
Chermes lariciatus Patch. Patch, 1909d, p. 307.
Chermes laricifoliae Fitch. Patch, 1909d, p. 296.
Lachnus laricifex Fitch. Oestlund, 1887, p. 32. Patch, 1912c.

L. sibirica Ledeb.
Chermes viridulus Cholodkovsky. Cholodkovsky, 1911, p. 175.
Lachnus maculosus Cholodkovsky. Cholodkovsky, 1899, p. 469.

L. sp.
Anisophleba hamadryas Koch. Koch, p. 320.
Chermes strobilobius Kalt. Cholodkovsky, 1907, p. 13. (var. tardoides Chd.) Cholodkovsky, 1911, pp. 174, 175.
Chermes viridanus Chol. Cholodkovsky, 1907, p. 19.
Chermes viridis Ratz (laricis Hartig). Cholodkovsky, 1907, p. 7.
Lachnus laricis Koch. Koch, p. 242.
Periphyllus laricae Haliday. Zoölogical Record, 1868, p. 416.

PICEA. Spruce.

P. Abies (L.) Karst, (excelsa Link) (Pinus abies) (Abies excelsa) (Abies picea) Norway Spruce.
Aphis abietaria Walker. Walker, 1852, p. 1035. (Host not recorded. Name indicates same host as *abietis* Walker.)
Aphis abietina Walker. Buckton, 2, p. 44. Walker, 1849a, p. 301. Theobald, 1911-12.

Aphis abietis Walker. Walker, 1848b, p. 100.

Aphrastasia pectinatae (Chol.) CB. (Chermes pectinatae Chol. 1888) (coccineus Chol. 1889 nec Ratz 1843) (Dreyfusia pectinatae (Chol.) CB 1907-08) Börner, 1908a, p. 211. Börner, 1909, p. 502.

Chermes abietis L. Dreyfus (geniculatus Ratz 1843) (lapponicus Chldk. 1889) (laricis Hartig 1837) (pini, piceae Gleditsch 1774) (strobilobius Blochmann 1887) (viridis Chldk. 1895) ("Picea excelsa u s w."). Börner, 1908a, p. 211.

Chermes abietis Cholodkovsky. Patch, 1909d. p. 307.

Chermes-Dreyfusia funitectus Dreyfus (nec Chldk. 1907) Börner, 1908a, p. 207.

(?) *Chermes-Dreyfusia piceae* Ratz. (funitectus Chldk. nec Dreyfus) (nordmannianae Eckstein) (piceae var bouvieri Chldk.) (? obtectus Ratz). Börner, 1908a, p. 211.

Chermes similis Gillette. Patch. 1909d. p. 307.

Cnaphalodes affinis CB. Börner. 1908a. p. 211.

Cnaphalodes strobilobius (Kalt.) CB. (laricis Vallot 1836) (hamadryas Koch. 1857) (abietis L. 1761) (atratus Buckton. 1883) (coccineus Ratz 1843) (geniculatus Ratz 1843) (lapponicus Chldk. 1889. var. praecox Chldk. 1894, var. tardus Chldk. 1895) (lariceti Altum 1889) (pini, piceae et abietis Gleditsch 1774) Börner, 1908a. p. 167.

Lachnus bogdanowi Mordwilko. Mordwilko, 1899. p. 404.

Lachnus fasciatus (farinosus Cholodk.) Mordwilko, 1899, p. 404.

Lachnus fasciatus Burm. (A. costata Zetterstedt?). Kaltenbach, 1843, p. 160.

Lachnus flavus Mordwilko. Mordwilko. 1899. p. 404.

Lachnus grossus Kaltenbach. Mordwilko. 1899. p. 405.

Lachnus hyalinus Koch. Patch, 1912c.

Lachnus macrocephalus Buckton. (hyalirus Koch?). Buckton. 3. p. 50.

Lachnus piceae Walk. (L. grossus Kalt.) (A. piceae Panzer). Buckton. 3. p. 58.

Lachnus piceae (Walker). Mordwilko. 1899. p. 405.

Lachnus piceicola Cholodk. Mordwilko. 1899. p. 406.

Lachnus piceicola Cholodkovsky. Schouteden 1906a. p. 207.

Lachnus pinicola (Walker) Kalt. (piniphila Ratz) Passerini. 1863. p. 65.

Lachnus pinicola (hyalinus Koch and Cholodk.). Mordwilko. 1899. p. 405.

Lachnus pinicola Kalt. Kaltenbach. 1843. p. 155.

Lachnus roboris (Linn) (L. fasciatus Burm.) (Cinara roboris Curtis). Kaltenbach. 1843. p. 149. (See also Buckton 3. p. 73.)

Lachnus viridescens Cholodkovsky. Schouteden, 1906a, p. 217.
Myzus obietinus Walker. Mordwilko, 1899, p. 404.
Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857) (? Chermes obtectus Ratz. 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 211.
Pineus sibiricus (Chldk.) CB. (Chermes cembrae Chldk. 1888) Börner, 1908a, p. 211.
Pineus strobi var. pineoides (Chldk.) CB. Börner, 1908a, p. 187.
Pineus? viridanus (Chldk). ("? Picea excelsa") Börner, 1908a, p. 211.

P. canadensis (Mill.) B. S. P. (alba Link). White or Cat Spruce.
Chermes abietis Chol. Patch, 1909d, p. 307.
Chermes loriciotus Patch. Patch, 1909d, p. 307.
Chermes similis Gillette. Patch, 1909d, p. 307.
Cnophalodes strobilobius (Kalt.) Börner, 1908a, p. 210.
Lachnus abietis Fitch. Williams, 1891, p. 24.
Mindarus abietinus Koch. Patch, 1909d, p. 243.
Mindarus obliquus Chol. Nüsslin, 1910, p. 408.
Pineus strobi (Htg.). ("? Picea alba") Börner, 1908a, p. 211.

P. Engelmanni Engelm.
Chermes cooleyi Gillette. Gillette, 1907b, p. 8.
Cnapholodes strobilobius (Kalt.) CB. Börner, 1908a, p. 210.
Gillettea cooleyi (Gillette) CB. Börner, 1909a, p. 504.

P. mariana B. S. P. (nigra Link) (Abies nigra). Black or Bog Spruce.
Chermes consolidotus Patch. Patch; 1909d, p. 307.
Chermes floccus Patch. Patch 1909d, p. 307.
Chermes pinifoliae Fitch. (abieticolens Thomas). Patch, 1909d, p. 306.
Chermes similis Gillette. Patch, 1909d, p. 307.
Lachnus obietis Fitch. Thomas 1879, p. 117.

P. Morinda Link.
Chermes himalayensis Stebbing. (Ch. abietis Buckton Ind. Mus. Not. 3 pp. 5, 54) (Ch. abietis-piceae Stebbing.) Stebbing, 1910, p. 99.
Dreyfusia obietis-piceae Stebbing. Börner, 1908a, p. 211.

P. orientalis Carr.
Adelges orientolis Mordwilko. Schouteden, 1906a, p. 191.
Adelges sibiricus Cholodkovsky. Schouteden, 1906a, p. 192.
Chermes orientalis Dreyfus. Cholodkovsky, 1907, p. 30.
Cnaphalodes strobilobius (Kalt.) Börner, 1908a, p. 210.
Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857) (? Chermes obtectus Ratz 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 211.

P. pungens Engelm (parryana)
Chermes cooleyi Gillette. Gillette, 1907b, p. 5.
Chermes cooleyi var. coweni Gillette. Gillette, 1907b, p. 11.
Chermes montanus Gillette. Gillette, 1907b, p. 14.
Chermes similis Gillette. Cillette, 1907b, p. 16.
Cnaphalodes strobilobius (Kalt.). Börner, 1908a, p. 210.

P. rubra Dietr. Red Spruce.
Chermes consolidatus Patch. Patch, 1909d, p. 307.

Chermes floccus Patch. Patch, 1909d, p. 307.

Chermes pinifoliae Fitch (abieticolens Thomas). Patch, 1909d, p. 306.

Chermes similis Gillette. Patch, 1909d, p. 307.

P. sitchensis Trautv.

Cnaphalodes strobilobius (Kalt.). Börner, 1908a, p. 210.

P. sp.

Aphis abietina Walker. Kaltenbach, 1874, p. 703.

Calobates rhizomae Hartig. Judeich-Nitsche, 1895, p. 1357.

Chermes abietis Linn (Adelges gallarum abietis Haliday). Del Guercio, 1900, p. 82.

Chermes abietis Kalt. Cholodkovsky, 1907, p. 9.

Chermes abietis-laricis. Experiment Station Record 1894-5, p. 567.

Chermes coccineus Chol. Cholodkovsky, 1908, p. 693.

Chermes coccineus Chol. Cholodkovsky, 1907, p. 21.

Chermes funitectus Dreyfus. Cholodkovsky, 1908, p. 693.

Chermes funitectus Dreyfus. Cholodkovsky, 1907, p. 24.

Chermes lapponicus Chol. Cholodkovsky, 1907, p. 17.

Chermes piceae Ratz. Cholodkovsky, 1908, p. 693.

Chermes sibiricus Chol. Cholodkovsky, 1907, p. 27.

Chermes strobilobius Kalt. Cholodkovsky, 1907, p. 13. (var tardoides Chol.) Cholodkovsky, 1911, pp. 174, 175.

Chermes viridis Ratz. (laricis Hartig). Cholodkovsky, 1907, p. 3.

Cnaphalodes lapponicus (Chol.) (Chermes). Börner, 1909a, p. 555.

Lachnus fasciatus Burm. (? A. costata Zett.) Kaltenbach, 1843, p. 237.

Lachnus fasciatus Kalt. (Aphis costata Zett.). Kaltenbach, 1874, p. 702.

Lachnus grossa Kalt. Kaltenbach, 1874, p. 702.

Lachnus hyalinus Koch. Koch, p. 239.

Lachnus pinicola Kalt. Kaltenbach, 1874, p. 702.

Lachnus subterraneus Hartig. Judeich-Nitsche, 1895, p. 1357.

Lachnus viridescens Cholodkovsky. Mordwilko, 1899, p. 406.

Lachnus sp. (near agilis Kalt.) Gillette, 1909a, p. 385.

Pemphigus (Rhizomaria) piceae Hartig. Tullgren, 1909, p. 141.

PINUS. Pine.

P. abies. See Picea abies.

P. Cembra L.

Chermes sibiricus Chol. Cholodkovsky, 1907, p. 27.

Pineus sibiricus (Chol.) CB. (Chermes cembrae Chol. 1888) Börner, 1908a, p. 211.

P. contorta Dougl. (murrayana).

Chermes coloradensis Gillette. Gillette, 1907b, p. 16.

Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857). (? Chermes obtectus Ratz. 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 172.

P. divaricata Dum.-Cours (Banksiana Lamb.)

Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857) (? Chermes obtectus Ratz 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 172.

P. echinata Mill. (mitis). Yellow Pine.

Aphis marginipennis Haldeman. Hunter, 1901, p. 101.

P. edulis Engelm. Piñon pine.

Chermes coloradensis Gillette. Gillette, 1907b, p. 17.

P. halepensis Mill. (abchasica)

Pineus laevis (Mskl.)? Börner, 1908a, p. 211.

Schizolachnus agilis Kalt. Mordwilko, 1909, p. 93.

P. insignis Dougl. (radiata).

Lachnus pini-radiatae Davidson. Davidson, 1909, p. 299.

Mindarus (Schizoneura) pinicola (Thomas). Clarke, 1903, p. 248.

Pineus laevis (Mskl.)? Börner, 1908a, p. 211.

P. Larix L. See Larix europaea.

P. Laricio Poir (Austriaca) (nigricans) Austrian pine.

Chermes pinicorticis Fitch. Storment, 1895 and 1896, Appendix, p. III.

Schizoneura fuliginosa Buckton. (? A. pini maritimae Dufour) Buckton 3, p. 97.

P. montana Mill. (pumilio).

Chermes pini Koch. Cholodkovsky, 1907, p. 31.

Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857) (? Chermes obtectus Ratz 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 206.

P. palustris Mill. (australis) Southern pine.

Lachnus australi Ashmead. Ashmead, 1881, p. 68.

P. pinaster Ait. (maritima).

Chermes pinicorticis Fitch. Davidson, 1909, p. 299. (identity doubtful?)

Lachnus tomentosus DeGeer (pineti Fab.) (piniphila Ratzeburg) Schouteden, 1906a, p. 207.

P. pinea L.

Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch 1857) (? Chermes obtectus Ratz 1844) (orientalis Dreyfus 1888) Börner, 1908a, p. 211.

P. ponderosa Dougl. (scopulorum) Bull pine. Yellow pine.

Chermes coloradensis Gillette. Gillette, 1907b, p. 16.

Lachnus flocculosa Williams. Williams, 1891, p. 20.

Lachnus pini Linn. Cowen, 1895, p. 117.

Lachnus ponderosae Williams. Williams, 1910 (1911), p. 24.

Schizoneura pinicola Thomas. Williams, 1891, p. 20.

P. Pumilio Haenke (uliginosa)

Anisophleba pini Koch. Kaltenbach, 1874, p. 702.

P. pyrenaica Lapeyr.

Schizoneura fuliginosa Buckton. (Aphis pini maritimae Dufour). Buckton, 3, p. 97.

P. strobus, L. White pine.

Chermes floccus Patch. Patch, 1909d, p. 307.

Chermes orientalis Dreyfus. Cholodkovsky, 1907, p. 31.

Chermes pinicorticis Fitch. Patch, 1909d, p. 303.

Chermes pinifoliae Fitch (abieticolens Thomas) Patch, 1909d, p. 306.

Essigella californicus Essig. Patch, 1912c.

Lachnus fasciatus Burmeister (A. costata Zetterstedt?). Kaltenbach, 1843, p. 160.

Lachnus rileyi Williams. Williams, 1910 (1911), p. 24.
Lachnus strobi Fitch. Weed, 1890, p. 116. Patch, 1912c.
Mindarus abietinus Koch (Schizoneura pinicola Thos.). Patch, 1910b, p. 242.
Pineus strobi (Hartig) CB. (Adelges corticalis Hardy 1850). (? Chermaphis pini var. laevis Maskell 1885) (pinicorticis Shimer 1865) (pinifoliae Shimer *not* Fitch, see Patch 1909d, p. 304.) (Coccus pinicorticis Fitch 1856.) Börner, 1908a, p. 211.
(*Schizoneura*) *pinicola* Thos. On roots. Felt, 1909, p. 80.
Schizoneura strobi Fitch. Thomas, 1879, p. 140. (Genus?)

P. sylvestris L. Scotch Pine.
Chermes corticalis Kalt. Kaltenbach, 1874, p. 702.
Chermes corticalis Kalt. (strobi Hartig?) (piceae (?) Ratz). Buckton 4, p. 24.
Chermes orientalis Dreyfus. Cholodkovsky, 1907, p. 31.
Chermes pini Koch. Cholodkovsky, 1907, p. 31.
Chermes pini Koch? (Anisophleba pini Koch). Buckton, 4, p. 41.
Chermes pinicorticis Fitch. Storment, 1895, and 1896. Appendix, p. III.
Glyphina pilosa Buck. Buckton, 4, p. 16.
Lachnus agilis Kalt. (A. agilis Walker). Buckton, 3, p. 47.
Lachnus fasciatus Burm. (A. costata Zetterstedt?). Kaltenbach, 1843, p. 160.
Lachnus fasciatus Burm. Burmeister, 1835, p. 93.
Lachnus hyperophilus Koch. Koch, p. 232 (Föhre).
Lachnus maculosus Cholodkovsky. Schouteden, 1906a, p. 204.
Lachnus nudus DeGeer. Schouteden, 1906a, p. 205.
Lachnus pineti (Schizoneura fulignosa Buckton?). Mordwilko, 1899, p. 398.
Lachnus pineti Koch (pineus Mordwilko) (piniphila Ratzeburg) Schouteden, 1906a, p. 207.
Lachnus pineti (Fab.) (A. tomentosa pini DeGeer). Kaltenbach, 1843, p. 162.
Lachnus pini (Linn) Kalt. (A. nuda pini DeGeer) (Pintyaphis Amyot). Buckton, 3, p. 50.
Lachnus pini Linn. Weed, 1800, p. 118. Patch, 1912c.
Lachnus pinicolus Kalt. Buckton, 3, p. 53.
Lachnus rileyi Williams. Williams, 1910 (1911), p. 24.
Lachnus roboris (Linn) (L. fasciatus Burm.) (Cinara roboris Curtis). Kaltenbach, 1843, p. 140. (See also Buckton, 3, p. 73).
Lachnus taeniatus Koch. Koch, p. 241 (Föhre).
Lachnus taeniatus Koch (? pinicola Walker). (cembrae Cholodkovsky). Schoutenden, 1006a, p. 207.
Lachnus tomentosus DeGeer. (pineti Fab.) (piniphila Ratzeburg) Schouteden, 1906a, p. 207.
Pineus laevis (Mskl.)? Börner, 1008, p. 211 (? sylvestris).

Pineus pini (L. Macqu.) CB. (Anisophleba pini Koch, 1857). (? Chermes obtectus Ratz 1844) (orientalis Dreyfus 1888). Börner, 1908a, p. 206.

Rhizobius pini Burmeister. Kaltenbach, 1843, p. 208.

Schizoneura fuliginosa (? A. pini maritimae Dufour). Buckton, 3, p. 97.

P. sp.

Aphis pilicornis Hartig. Hartig, 1841, p. 369. "Auf der Fichte."

Aphis? pinicolens Fitch. Thomas, 1879, p. 102.

Chaitophorus pinicolens (Fitch). Hunter, 1901, p. 88.

Essigella (Lachnus) californicus (Essig). Del Guercio. Essig, 1909, p. 74.

Holzneria (Pemphigus) poschingeri (Holzner) Licht. Lichtenstein, La Flore.

Lachnus agilis Kalt. Gillette, 1909a, p. 385.

Lachnus curtipilosus Mordwilko. Mordwilko, 1899, p. 399.

Lachnus pineus Mordwilko. Mordwilko, 1899, pp. 359, 399.

Lachnus pinihabitans Mordwilko. Mordwilko, 1899, pp. 48, 399.

Lachnus taeniatoides. Mordwilko, 1899, pp. 316, 526 and 399.

Lachnus sp. Gillette. Gillette, 1909a. p. 385.

Pemphigus degeeri, Kalt. Kaltenbach, 1843. p. 186.

PSEUDOTSUGA.

P. Douglasii Carr (mucronata). Red fir.

Chermes cooleyi Gillette. Gillette, 1907b. p. 6.

Chermes cooleyi var. coweni Gillette. Gillette, 1907b, p. 10.

Chermes coweni Gillette. Davidson, 1909, p. 299.

TAXUS. Yew.

T. baccata L. Irish Yew.

Chermes taxi Buckton. Buckton, 1886, p. 327. Schouteden 1906c, p. (6). 35. "a Coccid according to Cholodkovsky."

THUJA. Arbor vitae.

T. occidentalis L. Arbor vitae. White Cedar.

Lachnus juniperi Degeer. Essig, 1911b, p. 543.

TSUGA. Hemlock.

T. canadensis (L.) Carr (Abies canadensis Michx).

Chermes-Dreyfusia funitectus Dreyfus (nec Chldk. 1907). Börner, 1908a, p. 207.

Chermes funitectus Dreyfus. Cholodkovsky, 1907, p. 24.

TYPHACEAE. CAT-TAIL FAMILY.

TYPHA. (Thypha.) Cat-tail Flag.

T. angustifolia L.

Myzus persicae Pass. Passerini Flora.

T. latifolia L. (major). Common Cat-tail.

Rhopalosiphum nymphaeae (L.) Koch (A. butomi Schrank) (R. najadum Koch). Passerini, 1863, p. 21.

T. shuttleworthii Koch.

Myzus persicae Pass. Passerini Flora.

SPARGANIACEAE. BUR-REED FAMILY.

SPARGANIUM. Bur-reed.

S. ramosum Curt.

Rhopalosiphum nymphaeae (L.) Koch. (A. butomi Schrank) (R. najadum Koch). Passerini, 1863. p. 21.

NAJADACEAE. PONDWEED FAMILY.

NAJAS. Naiad.

N. flexilis (Willd) Rostk. & Schmidt. (Naias flexilis).

Rhopalosiphum nymphaeae (Linn.). Williams, 1891, p. 18.

POTAMOGETON. Pondweed.

P. natans.

Rhopalosiphum nymphaeae (Linn.) Koch. Buckton, 2. p. 13.

P. sp.

Rhopalosiphum najadum Koch. Koch. p. 45.

ALISMACEAE. WATER-PLANTAIN FAMILY.

ALISMA. Water Plantain.

A. plantago-aquatica L.

Aphis abbreviata Patch. Patch. 1912c.

Rhopalosiphum nymphеae (Linn.). Buckton. 2. p. 13. Patch, 1912c.

Rhopalosiphum nymphaeae (L.) Koch. (A. butomi Schrank) (R. najadum Koch). Passerini, 1863. p. 21.

Rhopalosiphum nymphaeae L. (Rh. alismae Koch in litt.). Koch. p. 26.

BUTOMUS.

B. umbellatus. L.

Rhopalosiphum nymphaeae (Linn.) Koch. Buckton. 2. p. 13.

B. sp.

Rhopalosiphum butomi Schrank. Lichtenstein. La Flore.

SAGITTARIA. Arrow-head.

S. latifolia Willd (variabilis Eng.)

Rhopalosiphum nymphaeae Linn. (Aphis aquaticus Jackson). Davis, 1910a, p. 245.

HYDROCHARITACEAE. FROG'S BIT FAMILY.

HYDROCHARIS.

H. Morsus-ranae L.
Rhopalosiphum nymphaeae (Linn.) Koch. Buckton, 2, p. 13.

ELODEA. Water-weed.

E. canadensis Michx. (Philotria canadense).
Rhopalosiphum nymphaeae Linn. (Aphis aquaticus Jackson). Davis 1910a, p. 245.

PHILOTRIA. See Elodea.

GRAMINEAE. GRASS FAMILY.

Agropyron.

A. glaucum. Colorado Blue-stem.
Brachycolus tritici Gillette. Gillette, 1911b, p. 441.
Chaitophorus agropyronensis Gillette. Gillette, 1911b, p. 443.

AGROSTIS. Bent Grass.

A. plumosa.
Tetraneura graminis Monell. Patch, 1910a, p. 210.
A. alba L. Fiorin or White Bent Grass (vulgaris Thurb, Red Top).
Brachycolus stellariae Hardy. (holci Hardy). Schouteden, 1906a, p. 212.
Macrosiphum cerealis (Kalt.); Pergande, 1904a, p. 20.
Siphonophora avenae Fab. Williams, 1891, p. 13.

AIRA (in part). See Deschampsia.

ALOPECURUS. Foxtail Grass.

G. geniculatus L. Floating Foxtail Grass.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.

ANDROPOGON. Beard Grass.

A. furcatus Muhl.
Schizoneura corni Fab. (S. venusta Pass.) (E. cornicola Walsh) (E. fungicola Walsh)(S. panicola Thomas). Hunter, 1901, p. 81.

A. sorghum.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.

ANTHOXANTHUM. Sweet Vernal Grass.

A. odoratum L.
Sipha graminis Kaltenbach. Schouteden, 1906a, p. 212.

ARRHENATHERUM. Oat Grass.

A. elatius (L) Beauv. (Avena elatior). Tall Oat Grass.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.

ARUNDO.

A. Donax L. Giant Reed.
Aphis donacis Pass. Ferrari, 1872, p. 72.
A. phragmitis. See Phragmites communis.
A. sp.
Aphis arundinis Fab. Kaltenbach, 1874, p. 765.
Callipterus arundicolens Clarke. Clarke, 1903, p. 249.

AVENA. Oat.

A. elatior. See Arrhenatherum elatius.
A. fatua L.
Aphis avenae Fab. Kaltenbach, 1874, p. 735.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.
Chaitophorus solicivora Pass. Ferrari, 1872, p. 76.
Siphonophora granaria (Kirby) (A. avenae Fab?) (A. hordei Kyber) (A. cerealis Kalt.) (Bromaphis Amyot) (S. cerealis Koch). Buckton, 1, p. 116.
Toxoptera graminum Rondani. Macchiati, 1883, p. 237.
A. pratensis L.
Geoica carnosa Buckton. Schouteden, 1902, p. 140.
A. sativa L. (Oats).
Amycla fuscifrons Koch. Koch, p. 302.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Macrosiphum granaria Buckton (avenae Thos. in part). Pergande, 1904a, p. 15.
Macrosiphum trifolii Pergande. Pergande, 1904a, p. 21.
Pemphigus boyeri Pass. (Amycla fuscifrons Koch.) Ferrari, 1872, p. 83.
Pemphigus fuscifrons Koch. Buckton, 3, p. 115.
Sipha avenae Del Guercio. Del Guercio, 1900, p. 116.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.
Sipha maydis Pass. Ferrari, 1872, p. 78.
Siphocoryne avenae (Fab.) (mali Fitch) (avenae Fitch) (prunifoliae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8. Patch, 1912c.
Siphonophora cerealis Koch (Aphis cerealis Kalt.) (A. avenae Walker *non* Schrank). Passerini, 1863, p. 12.
Siphonophora granaria Kirby. Buckton, 1, p. 116.
Toxoptera graminum R. (Pass.). Hunter, 1909, p. 102.
A. strigosa Schreb.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.
A. sp.
Amycla (Aphis) fuscifrons Koch. Kaltenbach, 1874, p. 757.
Aphis avena, Linn. Kaltenbach, 1874, p. 756.
Aphis dirhoda Walker. Walker, 1849a, p. 43.
Sipha (Aphis) graminis Kalt. Kaltenbach, 1874, p. 757.
Siphonophora avenae Walker. Lichtenstein, La Flore.
Toxoptera graminum Rondani. Buckton, 3, p. 135.

BAMBUSA.

B. arundinacea Willd.

Oregma bumbusae Buckton. Schouteden, 1905, p. 187.

BROMUS. (Ceratochloa) Brome Grass.

B. arenarius Labill. (australis).

Schizoneura venusta Pass. Passerini, 1863, p. 69.

B. hordeaceus L. Soft Chess.

Aphis cerealis Kalt. Kaltenbach, 1874, p. 745.

B. maximus Df.

Toxoptera graminum Rondani. Macchiati, 1883, p. 237.

B. mollis L.

Pentaphis pawlowae Mordwilko. Mordwilko, 1899, p. 83.

Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.

Toxoptera graminum Rondani. Hunter, 1909, p. 102.

B. racemosus L.

Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) Siphonophora avenae Thos. in part). Pergande, 1904a, p. 9.

B. secalinus L. Cheat or Chess.

Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.

Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.

Siphonophora avenae Fab. Williams, 1891, p. 13.

B. unioloides H. B. (Ceratochloa australis) (Schraderi).

Schizoneura venusta Pass. Passerini, 1860, p. 38.

Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.

B. sp.

Aphis dirhoda Walker. Walker, 1849a, p. 43.

Aploneura lentisci Pass. Lichtenstein, La Flore.

Schizoneura fodicus Buckton. Buckton, 3, p. 96.

CALAMAGROSTIS. Reed Bent Grass.

C. epigeios Roth.

Hyalopterus arundinis (Fab.) Koch. (A. pruni Walker partim). Passerini, 1863, p. 27.

CHAETOCHLOA.

C. glauca. See Setaria glauca.

COIX.

C. Lacryma-Jobi L.

Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.

Pemphigus fuscifrons Koch (Amycla fuscifrons Koch) (P. boyeri Pass.) (P. zeae maidis Löw?) (A. radicum Boyer?) Buckton, 3, p. 116.
Tychae setariae Pass. Passerini, 1863. p. 82.

CYNODON. Bermuda Grass.

C. Dactylon Pers.
Pemphigus boyeri Pass. (Amycla fuscifrons Koch). Ferrari, 1872, p. 83.
Pemphigus zeae maidis Dufour (A. radicum Boyer) (P. boyeri Pass.) (A. fuscifrons Koch) (Endeis bella Koch?) (Endeis rorea Koch) Macchiati, 1883, p. 265.
Sipha avenae Del Guercio. Del. Guercio, 1900, p. 116.
Tetraneura ulmi De Geer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.
Tychea trivialis Pass. Passerini, 1860, p. 40.

DACTYLIS. Orchard Grass.

D. glomerata L.
Aphis cerealis Kalt. Kaltenbach, 1874. p. 750.
Chaitophorus salicivora Pass. Ferrari. 1872. p. 76.
Hyalopterus dactylidis Hayhurst. Hayhurst, 1909a, p. 107.
Macrosiphum cerealis (Kalt.). Pergande, 1904a. p. 20.
Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande. 1904a. p. 8.
Siphonophora granaria (Kirby) Koch. (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton. 1. p. 116.
Toxoptera graminum Rondani. Hunter. 1909. p. 102.
D. sp.
Aphis dirhoda Walker. Walker. 1849a, p. 40.

DANTHONIA. Wild Oat Grass.

D. airoides Nees.

DENDROCALAMUS.

D. giganteus Munro.
Oregma bambusae Buckton. Schouteden. 1905. p. 187.

DESCHAMPSIA.

D. ambigua Beauv. (Aira caespitosa).
Tetraneura graminis Monell. Williams. 1891, p. 13.
D. caespitosa (L) Beauv. (Aira caespitosa).
Tetraneura graminis Monell. Patch. 1910a. p. 210.
Tetraneura ulmi De Geer. Cholodkovsky. 1889. p. 474.
D. flexuosa (L.) (Aira flexuosa). Common Hair Grass.

Forda viridana Buckton. Buckton, 4, p. 86.
Sipha berlesei Del Guercio. Schouteden, 1906a, p. 212.

DIGITARIA. Finger Grass.

D. filiformis (L.) Koeler.
Pentaphis trivialis Passerini. Schouteden, 1906a, p. 193.
D. humifusa Pers. (Panicum glabrum).
Pemphigus boyeri Pass. (Aphis radicum Boyer). Kaltenbach, 1874, p. 768.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Schizoneura panicola Thomas. Thomas, 1879, p. 138.
Schizoneura venusta Pass. Kaltenbach, 1874, p. 768.
Tychea panici Thomas. Thomas, 1879, p. 170.
Tychea setariae Pass. Kaltenbach, 1874, p. 768.
D. sanguinalis (L.) Scop. (Panicum sanguinale) (Syntherisma sanguinalis). Crab Grass.
Aphis (*Siphocoryne*) *avenae* Fab. (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Sipha (*Chaitophorus*) *flava* Forbes. Davis, 1909b, p. 157.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.
Aphis padi Kalt. (A. avenae Fab. Kalt.) Mordwilko, 1897, p. 283.

ECHINOCHLOA.

E. Crus-galli (L.) (crus-corvi) (Panicum crus-galli L.) Barnyard Grass.
Aphis annuae Oestlund. Williams, 1891, p. 13.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Aphis setariae Thomas. Gillette and Taylor, 1908, p. 42.
Geoica squamosa Hart. Hart, 1891 and 1892, p. 100.
Pemphigus boyeri Pass. (Amycla fuscifrons Koch). Ferrari, 1872, p. 83.
Schizoneura corni Fab. (S. venusta Pass.) (E. fungicola Walsh) (E. cornicola Walsh) (S. panicola Thomas). Hunter, 1901, p. 81. Williams, 1910 (1911). p. 19.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio. p. 19.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Sipha (*Chaitophorus*) *flava* Forbes. Davis, 1909b, p. 157.
Siphonophora setariae Thomas (Siphonophora panicola Thomas) Thomas, 1878, p. 6.
Tetraneura ulmi De Geer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio) Del Guercio, 1900, p. 93.

ELEUSINE. Goose Grass.

E. Indica Caertn.
Aphis setariae Thomas. Sanborn, 1910, p. 6.
Rhizobius eleusinis Thomas. Thomas, 1878, p. 15.

ELYMUS. Wild Rye.

E arenarius L.
Hyalopterus arundinis (Fab.) Koch (A. pruni Walker partim) Passerini. 1863, p. 27.
Hyalopterus pruni (Fab.) Koch. (Walker partim). Passerini, 1863, p. 27.
E. canadensis L.
Myzocallis (?) sp. Osborn. Osborn. 1892, p. 129.
E. geniculatus.
Aphis padi Kalt. (A. avenae Fab. Kalt.). Mordwilko, 1897, p. 283.
E. virginicus L.
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Macrosiphum granaria Buckton (avenae Thos. in part). Pergande, 1904a, p. 15.

ERAGROSTIS.

E. megastachya Link (major Host.).
Colopha ulmicola (Fitch) (eragrostidis Middleton). Patch, 1910, p. 205.
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.
Pemphigus caerulescens Pass. Passerini, 1863, p. 74.
Schizoneura corni Fab. S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Schizoneura venusta Pass. Passerini, 1860, p. 38.
Tychea eragrostidis Pass. Passerini, 1860, p. 39.
E. minor Host. (poaeoides).
Colopha eragrostidis Middleton. Williams, 1891, p. 13.
E. pectinacea Michx.
Schizoneura panicola Thomas. Oestlund, 1887, p. 29.
E. sp.
Pemphigus fuscifrons (Koch) (P. boyeri Pass.) (P. zeae maidis Löw?) (A. radicum Boyer?). Buckton, 3, p. 116.

FESTUCA. Fescue Grass.

F. elatior L. Taller or Meadow Fescue.
Tychea trivialis Pass. Passerini, 1860, p. 40.
F. ovina L. (duriuscula L.) Sheep's Fescue.
Forda formicaria Heyden (Rhizoterus vacca Hartig). Passerini, 1863, p. 79.
Paracletus cimiciformis Heyden. Buckton, 3, p. 67.
Tychea trivialis Pass. Kaltenbach, 1874, p. 753.

GLYCERIA. Manna Grass.

G. (Poa) aquatica L.
Sipha glyceriae Kaltenbach. Theobald, 1911-12.
G. distans Wahlenb.
Dryopeia (endeis) rosea Koch. Schouteden, 1906a, p. 193.
G. fluitans (L.) R. Br.
Sipha glyceriae (Kalt.) Pass. Passerini, Flora.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.
G. nervata (Willd) (Panicularia nervata). Fowl Meadow Grass.
Amphorophora howardii Wilson. Wilson, 1911, p. 59.

HIEROCHLOE. Holy Grass.

H. australis Roem. (Holcus australis).
Schizoneura venusta Pass. Kaltenbach, 1874, p. 768.

HOLCUS.

H. mollis L.
Aphis holci Ferrari. Ferrari, 1872, p. 63.
Brachycolus stellariae Hardy (holci Hardy). Buckton, 2, p. 148.
Forda formicaria Heyden (Rhizoterus vacca Hartig). Buckton 4, p. 84.
Siphonophora cerealis Kalt. Ferrari, 1872, p. 56.
H. sp.
Aphis dirhoda Walker. Walker, 1849a, p. 43.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 758.
Brachycolus stelleriae Hardy. (holci Hardy). Schouteden, 1906a, p. 212.
Sipha maidis Pass. Lichtenstein, La Flore.
Sipha schoutedeni Del Guercio. Schouteden, 1906a, p. 212.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.

HORDEUM. Barley.

H. distichon L.
Aphis avenae Fab. Kaltenbach, 1874, p. 735.
H. jubatum L. Squirrel-tail Grass.
Siphonophora avenae Fab. Williams, 1891, p. 13.
Schizoneura corni? (Fab.). Williams, 1891, p. 13.
H. murinum L.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.
Sipha elegans Del Guercio.
Siphonophora cerealis Kalt. Ferrari, 1872, p. 56.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) cerealis Kalt.) (Bromaphis Amyot) Buckton, 1, p. 116.

Toxoptera graminum Rondani. Hunter, 1909, p. 102.

H. vulgare L. (sativum).

Aphis avenae Fab. Kaltenbach, 1874, p. 735.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Brachycolus korotnevi Mordwilko. Cholodkovsky, 1910, p. 147.
Siphocoryne avenae (Fab.) Patch, 1912c.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.

H. sp.

Aphis dirhoda Walker. Walker, 1849a, p. 43.
Endeis (Aphis) bella Koch. Kaltenbach, 1874, p. 735.
Sipha maidis Pass. Lichtenstein, La Flore.

KOELERIA.

K. cristata L.

Aphis padi Kalt. (A. avenae Fab. Kalt.). Mordwilko, 1897, p. 283.

LEERSIA. Cut-grass.

L. oryzoides Sw. (Oryza clandestina). Rice Cut-grass.

Sipha glyceriae (Kalt.) Pass. Passerini, 1863, p. 63.

L. virginica Willd. White Grass.

Tetraneura graminis Monell. Patch, 1910a, p. 210.

LEPTOCHLOA.

L. filiformis Beauv.

Aphis maidi-radicis Forbes. Vickery, 1910, p. 101.

LOLIUM. Darnel.

L. multiflorum Lam. Italian Rye Grass.

Sipha maydis Pass. Macchiati, 1883, p. 261.

L. perenne L. Common Darnel, Perennial Ray or Rye Grass.

Pemphigus boyeri Pass. (Amycla fuscifrons Koch). Ferrari, 1872, p. 83.
Pemphigus Zeae maidis Dufour (A. radicum Boyer) (P. boyeri Pass.) (A. fuscifrons Koch) (Endeis bella Koch?) (Endeis rorea Koch) Macchiati, 1883, p. 265.
Sipha (Aphis) maydis Pass. Kaltenbach, 1874, p. 768.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.

L. temulentum L. Bearded Darnel.

Sipha maydis Pass. Passerini, 1860, p. 38.

L. sp.

Brachycolus korotnewi Mordwilko. Mordwilko, 1899, p. 350.
Pemphigus (Amycla) fuscifrons (Koch) (boyeri Pass.) (zeae maidis Löw?) (A. radicum Boyer?) Buckton, 3, p. 116.

MELICA. Melic Grass.

M. baulimi All. Auct. Pedem.
Aphis padi Kalt. (A. avenae Fab., Kalt.). Mordwilko, 1897, p. 283.

M. penicillaris Boiss. & Bal.
Aphis padi Kalt. (A. avenae Fab., Kalt.) Mordwilko, 1897, p. 283.

MUHLENBERGIA.

M. racemosa Michx.
Schizoneura corni Fab. (S. venusta Pass.) (E. fungicola Walsh) (E. cornicola Walsh) (S. panicola Thomas). Hunter, 1901, p. 81.

M. Schreberi Gmelin. Drop-seed, Nimble Will.
Aphis setariae Thomas. Sanborn, 1910, p. 6.

ORYZA.

O. sativa L. (montana).
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.
Sipha glyceriae (Kalt.) Pass. Passerini, 1863, p. 63.
Tetraneura ulmi DeGeer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.
Tychea setuosa Pass. Buckton, 4, p. 88.

O. sp.
Pemphigus (*Amycla*) *fuscifrons* Koch. (P. boyeri Pass.) (zeae maidis Löw?) (A. radicum Boyer?). Buckton, 3, p. 116.

PANICULARIA.

P. nervata. See Glyceria nervata.

PANICUM. Panic Grass. (In Part See Digitaria.)

P. capillare L. Old-witch Grass.
Schizoneura corni Fab. (S. venusta Pass.) (E. fungicola Walsh) (E. cornicola Walsh) (S. panicola Thomas). Hunter, 1901, p. 81.

P. Crus-galli. See Echinochloa Crus-galli (L.).

P. glabrum Gaud. See Digiaria humifusa Pers.

P. glaucum. See Setaria glauca.

P. polyanthes Schultes.
Aphis setariae Thomas. Sanborn, 1910, p. 6.

P. proliferum Lam.
Aphis seturiae Thomas. Gillette and Taylor, 1908, p. 42.
Aphis setariae (Thomas) (Siphonophora setariae Thomas) (S. panicola Thomas). Monell, 1879, p. 23.
Rhizobius spicatus Hart. Hart, 1891 and 1892, p. 105.
Schizoneura corni Fab. Williams, 1891, p. 13.

P. sanguinale L.
Aphis setariae Thos. Sanborn, 1910, p. 6.
Schizoneura corni Fab. (S. venusta Pass.) (E. fungicola Walsh) (E. cornicola Walsh) (S. panicola Thomas). Hunter, 1901, p. 81.

P. sp.

Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.

Colopha ulmicola (Fitch) (eragrostidis Middleton). Patch, 1910a, p. 205.

Pemphigus (*Amycla*) *fuscifrons* Koch (boyeri Pass.) (zeae maidis Löw?) (A. radicum Boyer?) Buckton, 3, p. 116.

Schizoneura panicola Thos. Hart, 1891 and 1892, p. 87.

Sipha (*chaitophorus*) *flava* Forbes. Davis. 1909b, p. 157.

Siphonophora panicola Thomas. Thomas, 1878, p. 6.

Trama erigeronensis Thos. (Tychea radicola Oestlund). Hart, 1891 and 1892, p. 93.

Tychea panici Thomas. Thomas, 1879. p. 138.

PHALARIS. Canary Grass.

P. arundinacea L. Reed Canary Grass.

Aphis glyceriae Kalt. Kaltenbach, 1874, p. 751.

Aphis lonicerae Sieb. Kaltenbach. 1874, p. 406.

P. canariensis L.

Siphonophora avenae Fab. Williams, 1891, p. 13.

PHLEUM.

P. pratense L. Timothy, Herd's Grass.

Sipha (*Chaitophorus*) *flava* Forbes. Davis. 1909b, p. 157.

Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.

PHRAGMITES. Reed.

P. communis L. Trin. (Phragmites Phragmites) (Arundo phragmites).

Hyalopterus arundinis (Fab.) Koch (A. phragmitidicola Oestl.) Oestlund, 1887, p. 48.

Hyalopterus arundinis (Fab.) (pruni Fab.) Osborn-Sirrine, 1893. p. 236.

Hyalopterus arundinis (Fab.) Koch (A. calamaphis Amyot). Buckton, 2. p. 112.

PHYLLOSTACHYS.

P. sp.

Aphis bambusae Fullaway "on bamboo (Phyllostachys?)." Fullaway, 1909. p. 36.

POA. Meadow Grass.

P. annua L. Low Spear Grass.

Aphis annuae Oestlund. Oestlund, 1887. p. 66.

Aphis glyceria Kalt. Kaltenbach. 1874. p. 751.

Aphis padi Kalt. (A. avenae Fab., Kalt.). Mordwilko. 1897. p. 282.

Endeis pellucida Buckton. Buckton, 4, p. 91.
Rhizobius poae Buckton. Buckton, 4, p. 93.
Rhizobius poae Thomas. Thomas, 1879, p. 167.
Rhizobius poae Thomas. Davis, 1910, p. 408.
Siphonophora avenae Fab. Williams, 1891, p. 13.
Siphonophora longipennis Buckton. Buckton, 1, p. 148.
Siphonophora poae Macchiati. Del Guercio, 1900, p. 164.
Tychea eragrostidis Buckton. Buckton, 4, p. 89.

P. compressa L. Canada Blue Grass, Wire Grass.
Aphis setariae Thomas. Sanborn, 1910, p. 6.
Rhopalosiphum dianthi var. *poae* Williams. Williams, 1891, p. 7.
Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson). (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.

P. megastachya. See Eragrostis.

P. pratensis L. June Grass, Spear Grass, Kentucky Blue Grass.
Forda formicaria Heyden (Rhizoterus vacca Hartig). Passerini, 1863, p. 79.
Forda occidentalis Hart. Hunter, 1901, p. 69
Geoica squamosa Hart. Hunter, 1901, p. 76
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Pemphigus boyeri Pass. Amycla fuscifrons Koch). Ferrari, 1872, p. 83.
Rhopalosiphum poae Gillette. Gillette, 1908a, p. 61.
Siphocoryne avenae (Fab.) (mali Fitch) (prunifoliae Fitch) (avenae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.
Toxoptera graminum Rondani. Hunter, 1909, p. 103.

P. trivialis L. Rough-stalked Meadow Grass.
Aphis padi Kalt. (A. avenae Fab., Kalt.). Mordwilko, 1897, p. 282.
Tychea trivialis Pass. Passerini, 1860, p. 40.

P. sp.
Aphis dirhoda Walker. Walker, 1849a, p. 43.
Aphis poae Hardy. Walker, 1852, p. 1038.
Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35.
Rhopalosiphum dianthi var *poae* Williams. Williams, 1910 (1911), p. 70.
Schizoneura venusta Pass. Kaltenbach, 1874, p. 753.
Sipha (*Chaitophorus*) *flava* Forbes. Davis, 1909b, p. 157.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.

SACCHARUM.

S. officinarum L. Sugar Cane.
Aphis adusta Zehntner. Zoölogical Record, 1898, p. 269.
Aphis maidis Fitch. Patch, 1912c.

Aphis sacchari Zehntner. Fullaway, 1909, p. 35.
Tetraneura lucifuga Zehntner. Jahresbericht Pflanzenkrankheiten, 1901 (1903), p. 229.

S. sp.
Oregma (Ceratovacuna) lanigera Zehntner. Schouteden, 1905, p. 184.

SECALE.

S. cereale L. Rye.
Aphis dirhoda Walker. Walker, 1849a, p. 43.
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Siphocoryne avenae (Fab.) (avenae Fitch) (mali Fitch) (prunifoliae Fitch) (annuae Oestl.) (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (cerealis Kalt.) (Bromaphis Amyot). Buckton, 1, p. 116.
Toxoptera graminum Rondani. Hunter, 1909, p. 103.

SETARIA. Bristly Foxtail Grass.

S. glauca Beauv. (Panicum glaucum) (Chaetochloa glauca). Foxtail, Pigeon Grass.
Aphis maidis-radicis Forbes. Davis, 1909b, p. 124.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Aphis (Siphonophora) setariae Thomas. Gillette and Taylor, 1908, p. 42.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Schizoneura panicola Thomas. Oestlund, 1887, p. 29.
Schizoneura venusta Pass. Passerini, 1860, p. 38.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.
Tychea eragrostidis Pass. Buckton, 4, p. 89.
Tychea panici Thomas. (Schizoneura?). Hunter, 1901, p. 69.
Tychea setariae Pass. Passerini, 1863, p. 82.

S. italica Beauv. (Setaria germanica).
Aphis maidis-radicis Forbes. Davis, 1909b, p. 124.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Schizoneura venusta Pass. Passerini, 1860, p. 38.

S. viridis L. Green Foxtail, Bottle Grass.
Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.
Aphis maidis Fitch. Williams, 1891, p. 14.
Aphis setariae (Thomas). Williams, 1891, p. 14.
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Schizoneura corni Fab. (S. graminis Del Guercio). Del Guercio, 1900, p. 103.
Schizoneura corni (Fab.) (S. venusta Pass.) (E. fungicola Walsh) (E. cornicola Walsh) (S. panicola Thomas). Hunter, 1901, p. 81.

Schizoneura venusta Pass. Ferrari, 1872, p. 82.
Tychea setariae Pass. Passerini, 1860, p. 40.

S. sp.
Tetraneura rubra Licht. ("nach Mordwilko identisch mit Pemphigus Zeae-maydis Boyer"). Cholodkovsky, 1910, p. 149.

SORGHUM.

S. Dora Griseb.
Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.

S. halepense L. (glycychylum). Johnson Grass.
Aphis avenae Fab. Passerini, 1863, p. 35.
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.
Sipha maydis Pass. Passerini, 1860, p. 38.
Tetraneura ulmi De Geer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.

S. saccharatum.
Aphis avenae Fab. Passerini, 1863, p. 35.
Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.
Aphis maidis Fitch. Davis, 1909b, p. 145.
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.
Sipha maydis Pass. Passerini, 1860, p. 38.
Siphonophora caianensis Del Guercio. Del Guercio, 1900, p. 167.
Tetraneura ulmi De Geer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.

S. vulgare Pers. Broom Corn.
Aphis avenae Fab. Passerini, 1863, p. 35.
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 74.
Tetraneura ulmi De Geer (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.

S. sp.
Aphis sorghella Schouteden. Zoölogical Record, 1906, p. 423.
Aphis sorghi Theobald. Zoölogical Record, 1904, p. 337.
Pemphigus fuscifrons (Koch) (P. boyeri Pass.) (zeae maidis Löw?) (A. radicum Boyer?). Buckton, 3, p. 116.
Schizoneura panicola Thomas. Hart, 1891 and 1892, p. 87.
Toxoptera graminum Rondani. Buckton, 3, p. 135.

SPARTINA. Cord Grass.

S. cynosuroides Willd. Salt Reed Grass.
Schizoneura corni Fab. S. venusta Pass.) (E. fungicola Walsh) (panicola Thomas). Hunter, 1901, p. 81.

S. patens (Ait.) (juncea Willd).

Aphis laburni Kalt. Ferrari, 1872, p. 71.
Aphis medicaginis Koch. Ferrari, 1872, p. 68.

SYNTHERISMA.

S. sanguinalis. See Digitaria sanguinalis (L.) Scop.

TRIDENS.

T. seslerioides (Lichex) Nash.
Aphis setariae Thos. Sanborn, 1910, p. 6.

TRIODIA.

T. seslerioides Benth. (Tricuspis seslerioides Torr).
Hyalopterus dactylidis Hayhurst. Hayhurst, 1909a, p. 107.

TRITICUM.

T. dicoccum Schrank.
Aphis padi Kalt. (A. avenae Fab., Kalt.). Mordwilko, 1897, p. 283.
T. repens L.
Forda formicaria Heyden. Buckton, 4, p. 85.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.
T. sativum Lam. Wheat.
Macrosiphum avenivorum Kirkaldy. (S. granaria Buckton). Kirkaldy, 1905a, p. 132.
Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35.
Siphonophora granaria (Kirby) (avenae Fab?) (hordei Kyber) (A. cerealis Kalt.) (Bramaphis Amyot). Buckton, 1, p. 116.
T. Spelta L.
Sipha maydis Pass. Passerini, 1860, p. 38.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.
T. villosum P. B.
Toxoptera graminum Rondani. Macchiati, 1883, p. 237.
T. vulgare Vill.
Aphis cerealis Kalt. Kaltenbach, 1874, p. 753.
Brachycolus korotnevi Mordwilko. Cholodkovsky, 1910, p. 147.
Macrosiphum cerealis (Kalt.). Pergande, 1904a, p. 20.
Macrosiphum granaria (Buckton) (avenae Thos. in part.) Pergande, 1904a, p. 15.
Macrosiphum trifolii Pergande. Pergande, 1904, p. 21.
Schizoneura venusta Pass. Passerini, 1863, p. 69.
Siphocoryne avenae (Fab.) (avenae Fitch) (fali Fitch) (prunifoliae Fitch) (annuae Oestl. (fitchii Sanderson) (Siphonophora avenae Thos. in part). Pergande, 1904a, p. 8.
Siphonophora cerealis Koch (Aphis cerealis Kalt.) (A. avenae Walker *non* Schrank). Passerini, 1863, p. 12.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.
Tychea trivialis Pass. Kaltenbach, 1874, p. 753.

T. sp.

Aphis cerealis Kalt. Kaltenbach, 1874, p. 744.
Aphis dirroda Walker . Walker, 1849a, p. 43.
Aphis glyceriae Kalt. Kaltenbach, 1874, p. 744.
Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.
Aphis mali Linn. Williams, 1891, p. 26.
Aphis sp. Williams, 1891, p. 26.
Brachycolus tritici Gillette. Davis, 1910b, p. 414.
Callipterus sp. Williams, 1891, p. 26.
Colopha rossica Chol. Cholodkovsky, 1897, pp. 1-3.
Endeis bella Koch. Kaltenbach, 1874, p. 744.
Megoura sp. Williams, 1891, p. 26.
Rhopalosiphum sp. Williams, 1891, p. 26.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.
Toxares sp. Williams, 1891, p. 27.
Tychea eragrostidis Pass. Lichtenstein, La Flore.
Tychea amycli Koch. Kaltenbach, 1874, p. 744.

ZEA.

Z. Mays L. Maize. Indian Corn.

Aphis maidi-radicis Forbes. Davis, 1909b, p. 124.
Aphis maidis Fitch. Davis, 1909b, p. 145. Patch, 1912c.
Aphis papaveris Fab. (A. fabae Scopoli) (A. aparines Schrank). Passerini, 1863, p. 46.
Aphis zeae Bonafous. Lichtenstein, 1885.
Forda occidentalis Hart. Hart, 1891 and 1892, p. 95.
Geoica squamosa Hart. Hart, 1891 and 1892, p. 99.
Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35. Patch, 1912c.
Pemphigus boyeri Pass. (A. radicum Boyer) (Amycla fuscifrons Koch). Passerini, 1863, p. 76.
Pemphigus (Amycla) fuscifrons (Koch) (P. boyeri Pass.) (P. zeae maidis Löw?) (A. radicum Boyer?). Buckton, 3, p. 116.
Rhizobius spicatus Hart. Hart, 1891 and 1892, p. 104.
Rhopalosiphum diantri (Schrank). Williams, 1891, p. 9.
Sipha (Chaitophorus) flava Forbes. Davis, 1909b, p. 157.
Sipha maydis Pass. Ferrari, 1872, p. 78.
Tetraneura ulmi De Geer (Coccus zeae maydis Dufour) (Pemphigus fuscifrons Buckton) (P. saccharata Del Guercio). Del Guercio, 1900, p. 93.
Toxoptera graminum Rondani. Hunter, 1909, p. 102.
Trama erigeronensis Thos. (Tychea radicola Oestlund). Hart, 1891 and 1892, p. 93.
Tychea brevicornis Hart. Hart, 1891 and 1892, p. 97.
Tychea setariae Pass. Passerini, 1860, p. 40.

GRAMINEAE.

G. sp.

Atheroides serrulatus Haliday. Haliday, 1839, p. 189.
Forda formicaria Heyden (vacca Hartig). Schouteden, 1906a, p. 193.

Forda formicaria Kalt. Koch, p. 309.
Forda marginata Koch. Koch, p. 311.
Paracletus cimiciformis Heyden. Schouteden, 1906a, p. 200.
Schizoneura corni var. *venusta* Passerini. Schouteden, 1902, p. 137.
Siphonophora dirhoda Walker. Theobald, 1911, p. 17.
? *Tetraneura coerulescens* Pass. Schouteden, 1902. p. 138.
Tetraneura setariae Passerini. Schouteden, 1902, p. 138.
Tychea graminis Koch. Koch, p. 298.

CYPERACEAE. SEDGE FAMILY.

CAREX. Sedge.

C. arenaria Linn.
Aphis bufo Walker. Walker, 1848b, p. 46.
C. dioica L.
Endeis formicina Buckton. Buckton, 4, p. 91.
C. Nebraskensis.
Brachycolus ballii Gillette. Gillette. 1908a, p. 67. Gillette. 1909c, p. 119.
C. pseudocyperus L.
Aphis caricis Schouteden. Schouteden. 1906a, p. 218.
C. sp.
Callipterus flabellus Sanborn. Gillette, 1909c. p. 120.
Carolinaia caricis Wilson. Wilson, 1911, p. 62.
Forda formicaria Heyden. Schouteden, 1902, p. 137.
Toxoptera caricis Fullaway. Fullaway, 1909, p. 33.

CYPERUS. Galingale.

C. laevigatus L. (distachyos).
Aphis papaveris Fab. Macchiati, 1883. p. 256.
Aphis polyanthis Sulzer (A. tuberosae Boyer). Macchiati,. 1883. p. 256.
C. rotundus L. Nut Grass.
Aphis papaveris Fab. Macchiati, 1883. p. 256.
Myzocallis cyperis Macchiati. Macchiati, 1883. p. 259.
C. virens Michx.
Geoica cyperi Schouteden. Schouteden. 1902. p. 138.
C. sp.
Aphis cyperi Walker. Walker, 1848b. p. 45.

ERIOPHORUM. Cotton Grass.

E. vaginatum L.
Hyalopterus eriophori (Walker) Haliday. Buckton. 2. p. 117.

SCIRPUS. Bulrush.

S. cernuus Vahl. (Savii).
Toxoptera scirpi Pass. Macchiati. 1883, p. 237.
S. lacustris L.
Toxoptera scirpi Pass. Passerini. 1874. p. 1.

PALMAE.

CALAMUS.

C. sp.

Cerataphis lataniae Lichtenstein. Lichtenstein, La Flore.

LATANIA.

L. Commersonii J. F. Gmel. (borbonica) (rubra).

Cerataphis lataniae Licht. (Coccus? lataniae Boisduval 1867) (Boisduvalia lataniae Signoret 1868) (Asterolecanium orchidearum Westwood 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 91.

PRITCHARDIA.

P. sp.

Cerataphis lataniae (Boisd.) Licht. Fullaway, 1909, p. 46.

ARACEAE. ARUM FAMILY.

ACORUS. Sweet Flag.

A. Calamus L.

Rhopalosiphum nymphaeae (L.) Koch. (A. butomi Schrank) (R. najadus Koch). Passerini, 1863, p. 21.

AMORPHOPHALLUS.

A. sp.

Siphonophora circumflexus Buckton. Lichtenstein, Flore Supplement.

ARUM.

A. esculentum Linn. See Colocasia antiquorum.

A. italicum

Rhopalosiphum nymphaeae (Linn) Koch. Macchiati, 1883, p. 233.

A. sp.

Siphonophora circumflexa Buckton. Theobald, 1911, p. 17.

CALADIUM. See Colocasia.

CALLA. Water Arum.

C. Indica.

Rhopalosiphum dianthi (Schrank) (R. callae Koch. in litt.) Koch, p. 43.

C. sp.

Siphonophora malvae Mosley. Lichtenstein, Flore Supplement.

COLOCASIA.

C. Antiquorum (esculenta). Schott.

Aphis gossypii Glover. Fullaway, 1909, p. 40.
Aphis malvae (Walker). Williams, 1891, p. 8.
Rhopalosiphum dianthi (Schrank). Williams, 1891, p. 8.

RICHARDIA.

R. Africana Kunth (Aethiopica). Calla Lily.
Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35.
Rhopalosiphum nymphaeae Linn. Davis, 1910a, p. 245.
R. sp.
Rhopalosiphum dianthi Schrank. Williams, 1891, p. 8.

LEMNACEAE. DUCKWEED FAMILY.

LEMNA. Duckweed.

L. gibba L.
Rhopalosiphum nymphaeae (Linn.) Koch. Buckton, 2, p. 13.
L. minor L.
Rhopalosiphum nymphaeae Linn. Williams, 1891, p. 10.
L. polyrrhiza Linn.
Rhopalosiphum nymphaeae Linn. Williams, 1891, p. 10.
L. sp.
Rhopalosiphum nymphaeae Linn. (Aphis aquaticus Jackson). Davis, 1910a, p. 245.

PONTEDERIACEAE. PICKEREL-WEED FAMILY.

PONTEDERIA. Pickerel-weed.

P. sp.
Rhopalosiphum nymphae Linn. Lichtenstein, Flore Supplement.

JUNCACEAE. RUSH FAMILY.

JUNCUS. Rush.

J. articulatus L.
Athcroides hirtellus Haliday. Haliday, 1839, p. 189.
J. lampocarpus Ehrh. (lamprocarpus).
Aphis glyceriae Kalt. Kaltenbach, 1874, p. 751.
J. sp.
Rhopalosiphum nymphaeae Linn. Williams, 1891, p. 16.
Sipha glyceriae (Kalt.). Patch, 1910b, p. 242.

LUZULA. Wood Rush.

L. albida DC.
Aphis luzulae Kalt. Kaltenbach, 1874, p. 726.

LILIACEAE. LILY FAMILY.

ALLIUM. Onion.

A. sp.
Aphis allii Licht. (ined.). Lichtenstein, La Flore.

ASPARAGUS.

A. officinalis L. Garden Asparagus.
Aphis indistincta Walker. Walker, 1849c, p. 46.

Aphis rumicis Linn. (? aquilegiae nigra Kittel) (atriplicis Fabricius) (armata Hausman) (aparines Schrank) (dahliae Mosley) (evonymi Fabricius) (fabae Scopoli) (hortensis Fabricius) (papaveris Fabricius) (? solani Kittel) (thlaspeos Schrank). Schouteden, 1906a, p. 227.

Rhopalosiphum dianthi (Schk.). Williams, 1891, p. 5.

A. plumosus Baker.

Myzus achyrantes Monell. Sanborn, 1904, p. 71.

A. sp.

Aphis papaveris Fab. Kaltenbach, 1874, p. 723.

Myzus mahaleb (Boyer) (Phorodon humuli var. mahaleb Buckton) (Ph. mahaleb Monell) (? Siphonoprora achyrantes Monell). Hunter, 1901, p. 108.

Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35.

FUNKIA.

F. subcordata Spreng.

Aphis polyanthis Sulzer. (A. tuberosae Boyer). Passerini, 1863, p. 41.

HEMEROCALLIS. Day Lily.

H. sp.

Aphis sambuci Auct. Kalt. Ferrari, 1872, p. 71.

HYACINTHUS.

H. orientalis L.

Rhopalosiphum dianthi (Schrank) Koch. (persicae, Puceron du pecher Morren) (rapae Curtis, floris rapae Curtis, dubia? Curtis) (vastator Smee) (persicaecola Boisduval) (persicae Pass. *not* Sulzer, *not* Boyer, *not* Kalt.). Buckton, 2, p. 17.

Rhopalosiphum persicae (Sulzer) Pass. (A. dianthi Schrank) (A. vulgaris Kyber) (A. rapae Curtis) (A. dubia Curtis) (A. vastator Smee). Passerini, 1863, p. 20.

LILIUM. Lily.

L. candidum L.

Aphis lilicola Williams. Williams, 1910 (1911), p. 44.

Myzus persicae Sulzer. Gillette and Taylor, 1908, p. 35.

L. sp.

Aphis lilii Licht. (ined.). Lichtenstein, La Flore.

Rhopalosiphum dianthi (Schrank). Williams, 1891, p. 16.

Siphonophora lilii Monell. Comstock, 1879 (1880), p. 221.

RUSCUS.

R. androgynus. See Semele androgyna.

SEMELE.

S. androgyna Kunth. (Ruscus androgynus).
Aphis dianthi Schränk. Walker, 1850a, p. 394.

SMILAX. Green Brier.

S. herbacea L. Carrion flower.
Pemphigus attenuatus Osborn (*Lachnus smilacis* Williams.) Williams, 1910, p. 25.
S. rotundifolia L. Common Green Brier. Horse Brier.
Neoprociphilus attenuatus (Osborn & Sirrine). Patch, 1912c.

TULIPA.

T. Gesneriana L.
Rhopalosiphum dianthi (Schrank). Williams, 1891, p. 25.
Rhopalosiphum tulipae Thomas. Thomas, 1879, p. 80.
Siphonophora tulipae Monell. Williams, 1891, p. 25.
T. sp.
Aphis tulipae Boyer. Lichtenstein. La Flore.
Macrosiphum tulipae Monell. Davidson, 1910, p. 380.
Myzus persicae (Sulzer). Gillette and Taylor, 1908, p. 35.
Rhopalosiphum dianthi (Schrank) Koch (persicae, Puceron du pecher Morren) (rapae Curtis) (A. floris rapae Curtis) (dubia? Curtis) (persicaecola Boisduval) (Rh. persicae Pass.). Buckton, 2, p. 17.
Rhopalosiphum persicae (Sulzer) Pass. (A. dianthi Schrank) (A. vulgaris Kyber) (A. rapae Curtis) (A. dubia Curt.) (A. vastator Smee). Passerini, 1863, p. 20.

VERATRUM. False Hellebore.

V. album L.
Aphis veratri Walker. Walker, 1852, p. 1041.
V. Californicum Durand.
Aphis veratri Cowen. Cowen, 1895, p. 122.
V. sp.
Aphis veratri Cowen. Cockerell, 1903b, p. 114.
Aphis veratri Walker. Kaltenbach, 1874, p. 719.

YUCCA. Bear Grass.

Y. glauca Nutt. (angustifolia).
Aphis yuccae Cowen (yuccicola Williams?). Cowen, 1895, p. 122.
Aphis yuccicola Williams. Williams, 1910 (1911), p. 62.
Y. sp.
Aphis yuccae Licht. (ined.). Lichtenstein, La Flore.
Myzus roseum Macchiati. Lichtenstein, Flore Supplement.
Myzus rubrum Macchiati. Del Guercio, 1900, p. 151. Macchiati, 1883, p. 236.

ZYGADENUS.

Z. Nuttallii Coult.

Nectarophora martini Cockerell. Cockerell, 1903a, p. 170.

LILIACEAE.

L. sp.

Aphis sinensis Del Guercio. "Sopra un Giglio della China non ancora classificato." Del Guercio, 1900, p. 137.

DIOSCOREACEAE. YAM FAMILY.

DIOSCOREA. Yam.

D. bulbifera L. Air (Aero) Potato.

Aphis minuta Wilson. Wilson, 1911, p. 60.

AMARYLLIDACEAE. AMARYLLIS FAMILY.

AGAVE. American Aloe.

A. sp.

Aphis sambuci Auct. Kalt. Ferrari, 1872, p. 71.

NARCISSUS.

N. sp.

Aphis dianthi Schrank. Walker, 1850a, p. 394.

Rhopalosiphum persicae Sulzer. Lichtenstein, La Flore.

POLIANTHES.

P. tuberosa L. Tuberose.

Aphis polyanthis Sulzer. (A. tuberosae Boyer). Passerini, 1863, p. 41.

Rhopalosiphum dianthi (Schrank). Williams, 1891, p. 25.

IRIDACEAE. IRIS FAMILY.

CROCUS.

C. sp.

Rhopalosiphum dianthi (Schrank) Koch (persicae, Puceron du pecher, Morren) (rapae Curtis) (A. floris rapae Curtis) (dubia? Curtis). (vastator Smee) (persicaecola Boisduval). Buckton, 2, p. 17.

Rhopalosiphum persicae Sulzer. Lichtenstein, Flore Supplement.

GLADIOLUS.

G. dubius Eckl.

Rhopalosiphum persicae (Sulzer) Pass. (A. dianthi Schrank) (A. vulgaris Kyber) (A. rapae Curtis) (A. dubia Curt.) (A. vastator Smee). Passerini, 1863, p. 21.

G. sp.

Aphis gladioli Felt. Felt, 1908 (1909), p. 19. Patch, 1912c.
Aphis rumicis Linn. Patch, 1912c.
Macrosiphum solanifolii Ashmead. Patch, 1912c.
Myzus achryrantes Monell. Sanborn, 1904, p. 71.

IRIS. Fleur-de-lis.

I. florentina L.

Aphis iridis Del Guercio. (A. cirsii? Pass.) (A. candicans Pass?) Del Guercio, 1900, p. 129.

I. pumila L.

Rhopalosiphum dianthi (Schrank). Williams, 1891, p. 16.

I. sp.

Macrosiphum solanifolii Ashmead. Patch, 1912c.

SPIRAXIS.

S. sp.

Siphonophora circumflexa Buckton. Buckton, 1, p. 131.

MUSACEAE.

MUSA.

M. Ensete J. F. Gmel.

Aphis musae Schouteden. Schouteden. 1906a, p. 223.

M. sapientum L. Banana.

Pentalonia nigronervosa Coquerel. Wilson, 1909b, p. 346.

CANNACEAE.

CANNA.

C. indica L.

Rhopalosiphum dianthi (Schr.) Koch (persicae Puceron du pecher Morren) (rapae Curtis. floris rapae Curtis, dubia Curtis?) (vastator Smee) (persicaecola Boisduval) (R. persicae Pass.). Buckton, 2, p. 17.

ORCHIDACEAE. ORCHIS FAMILY.

CATTLEYA.

C. Loddigesii Lindl. (Harrisoniana).

Cerataphis lataniae Licht. (Coccus? lataniae Boisduval 1867) (Boisduvalia lataniae Signoret 1868) (Asterolecanium orchidearum Westwood 1879) (Ceratovacuna brasiliensis Hempel 1901). Embleton, 1903, p. 94.

COELIA.

C. albiflora.

Cerataphis lataniae Licht. (Coccus? lataniae Boisduval 1867) (Boisduvalia lataniae Signoret 1868) (Asterolecanium orchidearum Westwood, 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 94.

CORALLORHIZA. Coral Root.

C. multiflora Nutt.
Nectarophora corallorhizae Cockerell. Cockerell, 1903a, p. 167.

CYPRIPEDIUM. Lady's Slipper.

C. sp.
Cerataphis lataniae Licht. (Coccus? lataniae Boisduval, 1867) (Boisduvalia lataniae Signoret, 1868) (Asterolecanium orchidearum Westwood, 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 92.

DENDROBIUM.

D. sp.
Cerataphis lataniae Licht. (Coccus? lataniae Boisduval, 1867) (Boisduvalia lataniae Signoret, 1868) (Asterolecanium orchidearum Westwood, 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 92.

EPIDENDRUM.

E. sp.
Cerataphis lataniae Licht. (Coccus? lataniae Boisduval, 1867) (Boisduvalia lataniae Signoret, 1868) (Asterolecanium orchidearum Westwood, 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 94.

OPHRYS.

O. aranifera Huds.
Myzus cerasi Fab. Macchiati, 1883, p. 234.

SOBRALIA.

S. sp.
Cerataphis lataniae Licht. (Coccus? lataniae Boisduval, 1867) (Boisduvalia lataniae Signoret, 1868) (Asterolecanium orchidearum Westwood, 1879) (Ceratovacuna brasiliensis Hempel, 1901). Embleton, 1903, p. 92.

ORCHIDACEAE.

O. sp.
Siphonophora lutea Buckton. Buckton, 1, p. 120.

PIPERACEAE. PEPPER FAMILY.

SAURURUS. Lizard's Tail.

S. cernuus L.
Rhopalosiphum nymphaeae (L.) Koch (A. butomi Schrank) (R. najadum Koch). Passerini, 1863, p. 21.

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NOTES ON PSYLLIDAE:*

EDITH M. PATCH.

The present paper is a record of species many of which have been kindly lent me for study. For the most part the available data are very meagre and for this reason the accession numbers are usually given together with what collection notes have been preserved, in the hope that more biological information may be added by others. Detailed descriptions have been avoided as the distinguishing characters are shown more clearly in the illustrations.

Lot 1339 includes those specimens lent by Cornell University; Lot 1347, by Doctor C. Gordon Hewitt; Lot 1348, by Professor C. P. Gillette; Lot 1440, by Doctor W. E. Britton.

APHALARA.

Very little biological information concerning the species *Aphalara* in this country seems to be available. It is possible that when more collections of the nymphal stages have been made with the accompanying host plant data the species will be more easily defined. But at present from large series of specimens in several widely separated collections it has not been apparent to me in all cases which variations are of specific and which of individual significance. The shape of the wing from elongate to rotundiform; the breadth of the arch of Cu; the length of the branches of M; the presence, absence or degree ot wing maculation; the length of the caudal segment of the female; all these are certainly subject to much individual variation in closely allied species and the resulting confusion indicates that systematic work with this group should be undertaken only when a background of ecological data is at hand.

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* Papers from the Maine Agricultural Experiment Station: Entomology, No. 55.

A few species are placed on a dependable footing, however. Mally separated a *Rumex* species from a *Polygonum* species (1894-95) and gave characteristic figures of immature stages as well as excellent figures of the wings which clearly distinguish the two species he discusses. In order to avoid reverting to previous mix-ups including these species, I have chosen to attempt to trace them no farther back than Mally's paper.

Aphalara polygoni Mally (Foerster?)

On October 18, 1911, large numbers of nymphs and adults were found on *Polygonum* along the Stillwater river at Orono. The nymphs were most numerous at the leaf axle. Many of the pupæ present molted after they were collected so that bred material was obtained. Both the nymphs and adult specimens accord exactly with the *Polygonum* species figured by Mally. Lot 1341 Sub 7. Figures 370, 379, 383 and 387.

Crawford (1911) follows Loew in his synonomy for the *Polygonum* of Foerster. Material already determined as *calthae* in the collections I have worked over I have left as such with due respect for that determination. Enough variation is present, however, among these specimens to make me hesitate in absence of authentic host plant data to merge the *polygoni* of Mally with them. Figures 364, 378, 382, and 384, represent named "*calthae*" from the Colorado collection. Lot 1348 Sub 53, and Sub 47.

LITERATURE.

1894 ('95) Mally, C. W. Psyllidae found at Ames, Iowa. Proc. Iowa Acad. of Sc., Vol. II. Plate XV. Figs. 1, 2, 3. Plate XVII. Figs. 3.

1911 Crawford, D. L. American Psyllidae IV. Pomona Journal of Entomology. Vol. III, p. 495.

Aphalara nubifera sp. nov.

Ten specimens are at hand with data "Ft Collins Col., 6-13-99. Foothills. C. P. G. On *Sisymbrium canescens*, causing abnormal development of foliage in dense mass." This collection can be separated from the *polygoni* by slight differences only for the two are certainly very closely allied. The head and genitalia of both sexes resemble those of *polygoni*, though there are distinctions. The forceps of the male are longer and the smaller of the two terminal tooth-like projections is at a slightly greater distance from the tip in *nubifera* and the female genital segment is relatively longer, the lower plate being subequal to the two preceding segments while in *polygoni* it is subequal to but the one preceding segment.

The wing of *nubifera* is broader than that of *polygoni* and the cloudiness of the wings is differently disposed. Lot 1348 Sub 48. Figure 369.

Aphalara rumicis Mally.

Lot 1341 Sub 6 was collected at St. Louis, Mo., Sept. 22, 1911, by Mr. J. T. Monell who says of them;—"On *Rumex,* the broad leaved common one, I found a colony curling the leaves longitudinally into a pseudogall which turned scarlet—from these I reared a few which I mail to you."

This species is closely allied to those developing on *Polygonum* and *Sisymbrium,* Mally's description and figures definitely and sufficiently characterize the nymphs. The specific characters of the wing and forceps are shown in figures 372 and 377.

LITERATURE.

1894 ('95) Mally, C. W. Psyllidae found at Ames, Iowa. Proc. Iowa Acad. of Sc., Vol. II, p. 166. *A. exilis* Web. and Mohr., var, *rumicis,* var nov.

1911 Crawford, D. L. American Psyllidae IV. Pomona Journal of Entomology, Vol. III, p. 496. *A. calthae maculipennis* Loew.

Aphalara picta Zetterstedt.

A large species with wing 3.55 mm. long in the Colorado collection I take to be *picta* as figured by Crawford (1911). Figures 380, and 388 represent the forceps and the caudal segment of the female. Lot 1348 Sub 29.

LITERATURE.

1911 Crawford. Pomona Journal of Entomology, Vol. III, p. 501.

Aphalara fascipennis sp. nov.

Collections from Canada and New York are at hand of a beautiful species which comes close to *picta.* The genitalia of both sexes resemble *picta* closely. The abdomen of the male is constricted just cephalad the genital segment which is large and prominent; the forceps are long and from the lateral aspect are spatulate and attenuate at base; the lateral arms are long and tapering. The wing is broad and rotund and is decorated with a dusky band. Figure 366. Lot 1347 Sub. 30 includes 21 specimens with data "Ottawa, Ont. 7-VI-1903 B. Meadow—W. Metcalfe," and 3 specimens with data "27-VI-1903, W. Metcalfe." Lot 1339 and Sub. 24 includes 3 males with data "17-20 June, 1904. Mud Creek, Tompkins Co., N. Y."

The early stages are not known and the food plant is not recorded.

Aphalara artemisiae augustipennis Crawford.

This species as it exists in collections has a puzzling range of variation which biological data may sometime help to clear up. Fgures 363, 375, 376, and 386 are photographs of apparently typical details.

LITERATURE.

1911 Crawford, D. L. Pomona Journal of Entomology, Vol. III, p. 499.

Aphalara communis Crawford.

Figures 365, 374, and 389 show a species as maddening in its elastic variations as *artemisiae*. This is close to *veaziei* Patch and biological data are needed to put on a satisfactory basis either many closely allied species or a few species with a broad and catholic taste in variation.

Aphalara sp.

Figures 371 and 390 represent collections with rotundiform wings that merge by gentle degrees too nearly with the *communis* group to deal with in the absence of biological information.

Aphalara sp.

In the other direction traveling toward narrow winged specimens with long branches of M and Cu is a series which also is too flexible to separate satisfactorily and treat until ecological information is forth coming An extreme of this series is represented by figures 367, 373 and 381.

Aphalara nebulosa americana Crawford.

This pretty winged species is easily distinguished from the other species of the genus mentioned in this paper by the lateral arms of the male genitalia. Figures 368 and 385 represent details of Lot 1348 Sub 65 with data "Colo. 2204. 7-4-96. Larimer Col. C. P. G."

LITERATURE.

1911 Crawford, D. L. Pomona Journal of Entomology, Vol. III, p. 503.

PSYLLA.

Psylla annulata Fitch

The "Annulated Psylla" of Fitch can not possibly be a variety of *carpini*. The most conspicuous characteristic of this straw-yellow species on maple is the ringed appearance of the black and yellow antennae. The original description is certainly meagre but applies perfectly so far as it goes to this common maple species and not to the species occuring on horn beam.

A large collection from Rock maple *Acer saccharum* Marsh was made at Middletown, Conn., in May, 1911. The nymphs were sometimes on the upper side of leaf but occurred most numerously on the under side of the leaves and are nearly a leaf green in color. They were collected at various times from May 17-31. The adults are paler than the nymphs and were abundant May 30-31.

Me. 1345 Sub 2. Numerous nymphs, pupæ and adults, collected by Mr. William C. Woods at Middletown, Conn., from Rock Maple, *Acer saccharum* Marsh. Figs. 395, 411, 421.

Me. 1347. Sub 29. One male with data "Ottawa, Ont. 14-VI-1903. W. Metcalfe."

Me. 1347. Sub 40. Fourteen specimens with data "Ottawa, Ont. 14-VIII-1904. W. Metcalfe, B. Meadow, Maple, and one specimen with data "Ottawa, Ont. I-VII-1904. W. Metcalfe."

LITERATURE.

1851 Fitch, Asa. Catalogue, with references and descriptions of the insects collected and arranged for the State Cabinet of Natural History. *"Annulated Psylla, * P. annulata.* Straw-yellow; legs white; elytra hyaline, nerves straw yellow; antennæ black, basal half straw-yellow annulated with black. Length, 0.15. Occurs on the sugar-maple. No. 834, male; 835, female."

1881	Ashmead, Wm. H. Can. Ent. Vol. 13, p. 222. Listed.
1890	Packard, A. S. Forest Insects, p. 417. Listed.
1893	Riley, C. V. in Lintner IX, p. 411, "Probable var. carpini."
1894	Mally, C. W. Pro. Iowa Acad. Sc., Vol. 2, p. 153. Listed. Fig. 4, Plate 16.
1906	Felt, E. P. Woodland Trees II, p. 728.
1909 ('10)	Smith, J. B. Insects of N. J., p. 109. Listed.

Psylla negundinis Mally.

This species is certainly closely allied to *annulata* Fitch and the differential characters seem difficult to define. Mally, however, does not mention nor figure the antennal stripes characteristic of *annulata* as being present in *negundinis* and the pinned material in the collections at hand ofthis species do not show annulated antennae. Figures 393, 409, and 420 picture the head, wing and forceps of this species.

Me. 1339 Sub 46. Two specimens with data "Colo. 1605. Cornell U. Lot. 157. Sub 35. Received by exchange from Carl F. Baker."

Me. 1348 Sub 11. One female with data "Colo. 1981. 9-2-95. Ft. Collins C. P. G.," and one female with data "Colo. 1769, 9-26-94. C. F. B. Ft. Collins, on Box Elder."

Me. 1348 Sub 18. Five specimens with data "Colo. 1979. 9-31-95 Ft. Collins C. P. G. on Box Elder," and one specimen with data "Colo. 1769. 9-26-94. C. F. B. Ft. Collins. On Box Elder."

Me. 1348 Sub 24. One male with data "Colo. 1915. 7-5-94. Santa Fe. N. M., T. D. A. Cockerell."

LITERATURE.

1894 (1895) Mally, C. W. Proc. Acad. of Sci., Vol. 2. p. 155.

Psylla breviata n. sp.

Three females with data "Ottawa. Ont. Dows Swamp. 14-VI-1903 W. Metcalfe" comprise Me. 1347 Sub 36. The host-plant is not yet known.

This species comes close to *annulata* and *negundinis* both in wing and cauda of female. The antennae are short, joints 3 to 10 inclusive being subequal to width of cephalic aspect of head across the eyes. The frontal cones are rather straight at their medial margin but curved along the lateral edge. The head, wing and cauda are given in figures 397, 405, and 424, and will serve to make the species recognizable until enough ecological information is obtained to make this species deserving of more attention.

Psylla gilletti n. sp.

Psylla gilletti Riley, MS. seems to be well represented in collections though not accompanied by ecological data. The wing is characterized by the short acute stigma, the distinct heavy dark spot between tip of clavûs and margin of wing, and the four distinct linear dark marginal dashes as indicated in Fig. 396. The head of the female is well represented in Fig. 414. The female cauda (Fig. 428) is rather heavy and about subequal in length to the two preceding segments The male forceps (Fig. 422) end in two short rather blunt projections and the terminal inner setal spines are strong and stiff.

Me. 1339 Sub 42. One specimen with data "Colo. 1456. Cornell U. Lot 157. Sub 33. Psylla ribis Riley MS. Received by exchange from Carl F. Baker."

Me. 1348 Sub 6. One female with data "*Psylla gilletti* Riley MS. Colo. 1887, 6-11-95. Ft. Collins, C. P. G." One female with data "Colo. 2078, 4-22-96, C. P. G. Ft. Collins."

Me. 1348 Sub 20. One specimen with data "Onagra Ks., 5-26-92, C. P. G. Trinidad, Colo. *Psylla gilletti* Riley, MS." One specimen with data "464 Onagra Ks. 5-27-92, C. F. B." One specimen with data "Colo. 427. 5-19-92 Soldier Canyon, Colo. C. P. G." One specimen with data "Col. Ac. Cat. 28. Mrs. P. Gillette, Ft. Collins." Twenty-two specimens with data "Colo. 2075 4-22-96. C. P. G. Horse tooth Gulch (near Ft. Collins) Bloom of Salix." One specimen with data "Colo. 1887. 6-11-95 Ft. Collins. C. P. G." Two specimens with data "Colo. 2078. 4-22-96 C. P. G. Ft. Collins. Two specimens with data "Colo. 2195. 7-4-96 Larimer County C. P. G. One specimen with data "Colo. 2096. 5-9-96. Dixon Canyon (near Ft. Collins) C. P. G." One specimen with data "Colo. 2805. 10-22-97, Belvue, Colo. Emma Gillette." One specimen with data "Colo. 2138. 6-15-96 Camp Carter, Colo. C. P. G. One specimen with data "Colo. 2094. 5-7-96 Howes Gulch (near Ft. Collins) C. P. G." One specimen with data "Ft. Collins, Colo. 6-17-'99 E. D. Ball, Horsetooth Gulch."

Psylla pyricola.

This economic species was present in large number in 1910 upon pear in Camden, Maine. The leaves were badly discolored. Figures 398 and 434 show the wing and male cauda of this insect. Me. 1326 Sub 4.

LITERATURE (for America).

1884	Riley, C. V. Pro. Biol. Soc. Wash. Vol. 2.
1892	Slingerland, M. V. Bul. Cornell Univ. No. 44.
1893	Riley and Howard Insect Life, Vol. 5, p. 226.
1893	Lintner 9th Rept. p. 317.

1894 ('95)	Mally Proc. Iowa Acad. Sci. Vol. 2, p. 153, Listed.
1895	Marlatt, C. L. U. S. D. A. B. E. Circ. No. 7.
1896	Smith, J. B. Economic Entomology, p. 137.
1909 (1910)	Smith, J. B. Insects of New Jersey, p. 109. Listed.
1911	Patch, Edith M. Me. Agr. Exp. Sta. Bul. No. 187, p. 11. Recorded for Maine.

Psylla ribis n. sp.

Psylla ribis Riley, MS. is a species existing numerously in collections under its manuscript name. The wing (Fig. 392) is immaculate and the vein and stigma rather heavy. The head (Fig. 407) is with prominent eyes, moderately long antennæ and the cones subequal in length to the third antennal segment. The caudal segment of female (Fig. 430) is thick at base and about equal in length to the other abdominal segments. The upper plate is straight along dorsal line and is much longer than the lower plate. The male forceps (Fig. 417) are erect and simple with hairs very short, sparse and inconspicuous. There seem to be no food plant records available but the name is suggestive.

Me. 1348 Sub 7. One specimen with "Psylla ribis Riley. MS. Colo. 1556."

Me. 1348 Sub 25. Specimens with data "Marsll. Pas. Col. 8-27-99." "Ft. Collins, Col. 4-21-99," "Colo. 2074," "Colo. 2094," "Colo. 2204."

Psylla brevistigmata n. sp.

Two specimens in the Cornell collection which bears data "Alta Meadows Seq. Nat. Park, Cal. 19 July 1907. 9,000 ft. J. C. Bradley," seem distinctive enough to describe as new. The cauda (Fig. 427) is about the length of two preceding segments. The upper plate is thickly armed with short stout conical setulæ and scattered with a few long setæ. The facial cones are swollen at base and very divergent with rounded tips. Fig. 413. The broad wings are pale with pale shading (not heavy) along tips of veins. The stigma is broad at proximal edge but narrows suddenly and acutely as is shown in Fig. 399. Me. 1339 Sub 31.

Psylla hartigii Flor?

A species common on birch (*Betula populifolia*) in the vicinity of Orono comes too near to *hartigii* Flor as characterized by Sulc (1910) to descibe as new. Me. 1340 Sub 1 comprised

2 females collected from birch June 15, 1911; Lot 1340 Sub 2 comprised 4 males and 20 females collected from birch July 1, 1911; Lot 1340 Sub 7 was a collection of 2 females taken with *P. striata* on birch June 25, 1910.

The antenna is conspicuously shorter than in *galeaformis;* and the wings are yellow. The caudal segment of female is much like *galeaformis* except for the constant downward curve of the long upper plate. Figs. 394, 408, 423, 429, 432, and 433, sufficiently characterize this species to prevent its confusion with other birch psyllids in this country. The nymphs were not taken.

LITERATURE.

1910 Sulc, Dr. Karel. Prispevky Ku Poz nani Psyll. Tab. XII.

Psylla cerasi n. sp.

A species new to this country and for which I can find no place in European records, was taken on September 14, 1911, at Stillwater, Me., on wild cherry. Psyllid eggs, probably of this species were found on the same date tucked between leaf bud and twig of the same little tree.

This brilliant species had dorsal head and thorax rosy, dorsal abdomen almost vermillion, a black spot on dorsum of 1st abdominal segment, 5 vivid black transverse bands across the abdominal dorsum, the last coming just cephalad the genital segment. Antennal joints I, II, III rosy, rest black. Eyes bright black and bulging to width of thorax or slightly more. Wings clear and a little brownish. Ventral body pale.

A female distended with eggs had a total length, exclusive of wings and antennæ, of 3.8 mm. The wing (Fig. 400) with M and Rs approximating to give a pinched appearance. Wing without stigma. Head (Fig. 412) with large triangular facial cones rather acute at tip. Antennal length more than 2 1-2 times the breadth of head. The caudal segment (Fig. 431) with upper plate armed with large short blunt setulæ which give it a distinctly noduled appearance. Me. 1341 Sub 4.

Psylla coryli n. sp.

A species under the manuscript name of *Psylla coryli* Riley, MS. is sufficiently characterized by distinct large tooth-like projections on the inner side of the male forceps (Fig. 419) to distinguish it from any other described species of America. The wing (Fig. 391) is heavily veined and darkly shaded especially near the veins. The head (Fig. 406) is probably better characterized by the accompanying illustration than by a description. Me. 1348 Sub 61 with data "Colo. 1114."

PACHYPSYLLA.

It is with reluctance that I name as new species of this group but without a certainty of linking them with the galls described by Riley it is apparently the only thing to do with collection specimens. The figures will characterize these species it is hoped, and later biological data will probably be forthcoming to throw a light on the synonomy. *Pachypsylla C. mammae* Riley seems to be common in collections. This species has been figured in detail by Stough (1910) so that nothing except a wing (Fig. 401) is given here, for the sake of comparison with the other species.

Pachypsylla tridentata n. sp.

A species easily characterized from other described species by the wings is here described as new. The wings (Fig. 402) have a row of irregular dark spots extending across the veins on distal third of wing. The branches of M and the approximate branch of the Cu are tipped with an angular mark which gives the wing the appearance of being decorated with three tridents. The head (Fig. 415) is characteristic of the genus with rounded lobes and short, stout antennæ. The female cauda (Fig. 425) is long and stout and is subequal in length to the four preceding segments. The male cauda (Fig. 437) is preceded by a short constriction. The forceps are shown in Fig. 418. Me. 1339 Sub 40 is a single specimen from the Cornell collection and Me. 1348 Sub 67 comprises 4 specimens with data "Colo. 2049, 3-4-96. Canon City, Colo. From galls on *Celtis*."

Pachypsylla dubia n. sp.

Specimens from *Celtis* galls in the Cornell collection agree with the description of *C. gemma* so far as the shape of the wing goes, but that species is characterized by Riley as having wings "uniformly immaculate" which precludes the finely but densely mottled wing of *dubia* (Fig. 404). The head (Fig. 416) has the broad rounded lobes and short antennae of the allied specimens.

Pachypsylla pallida n. sp.

Material bearing the data "Arizona C. U. Lot 34; Cornell U. Lot 45 Sub 469" is apparently a new *Pachypsylla*. The wing (Fig. 403) is wide at the basal third and broad for its length. It is more or less shaded especially at the distal marginal band, proximad which is a pale path extending transversely across the wing. From the form of both the wing and the head this species seems allied to *dubia* though easily distinguishable from it and the female cauda is also similar. The antenna is subequal in length to the width of the head across the eyes. The cones are broad and thick and bluntly rounded. (Fig. 410.) Me. 1339 Sub 51. Me. 1339 Sub 55 and 56.

TRIOZINAE.

Trioza aylmeriae sp. nov.

This species is easily distinguished from previously described members of this genus in America. The head (Fig, 330) is of an ordinary *Trioza* type with large divergent cones rather acutely rounded apically. The wing (Fig. 316) measures about 3 mm. in length, and is rather evenly elongate with tip rounded. They are clear and unmarked except for the three marginal spots common for this genus. The branches of M and Cu are relatively long.

The female caudal segment (Figs. 343 and 346) is large and the slender tip of the upper plate extends beyond the lower plate. The lateral arms of the male cauda (Fig. 345) are conspicuously long and heavily supplied with long setæ. The forceps are enlarged and blunt at the tip (Fig 344), Lot 1347 Sub 19. Eleven specimens with data, "Bilberry. Aylmer, Ottawa, Ont. 20-V 1906 W. Metcalfe."

Trioza collaris Crawford.

Lat 1348 Sub 74. A single female with data "Ariz. 2217, 5-20-96 Dr. R. E. Knize, Tuscon," is apparently *collaris* Crawford. The cauda is shown in Fig. 358 and the wing is not distinguishable from that of *longistylus* which is shown in Fig. 320. It measures about 3.5 mm.

LITERATURE.

1910 Crawford, D. L. American Psyllidae I. p. 229.
1910 Crawford, D. L. American Psyllidae II, p. 347.
1911 Crawford, D. L. American Psyllidae III, p. 435.

Trioza diospyri (Ashmead).

The head, wing and female cauda of this species are shown in Figs. 331, 318, and 357. The wing is clear with the veins slender and distinct. It measures about 3.8 mm. The three marginal dashes are especially narrow.

Lot 1339 Sub 47. One male and one female with the data "Trioza diospyra Le Baron? River Des Peres, St. Louis, Mo. June 2, '77. Persimmon. Cornell U. Lot 62. Collected by Theo. Pergande and determined by Uhler. Given J. H. C. by Pergande."

LITERATURE.

1881 Ashmead, Wm. H. Canadian Entomologist. Vol 13, p. 222. *Psylla diospyri.*
1894 ('95) Mally, C. W. Proceedings of the Iowa Academy of Sciences Vol. 2, p. 154. *Trioza diospyri* Ashmead, listed.
1909 ('10) Smith, J. B. Insects of New Jersey, p. 110. listed.
1910 Crawford, D. L. American Psyllidae II, p. 352. *Trioza diospyri* Ashmead (*latipennis* Crawford.)

Trioza dubia sp. nov.

Lot 1339 Sub 17. Two females and one male with data "S. Francisco dunes. Cal. 11 Nov. 1907. Bradley." Lot 1339 Sub 19. One female lent by Cornell University with data "Berkeley, Cal. 5 Nov. '06. J. C. Bradley."

The name of this species indicates the amount known concerning it at time of description. The wing measures about 2.75 mm in length. It is clear and unmarked except for the three marginal dashes common in this genus. The venation as shown in Fig. 319 is much like that of *maura*. The head with moderately long dark facial cones contiguous in basal two-thirds, distal third divergent, subacute at tip, is of the same general type as *maura*. The caudal segment of male has long slender forceps strongly curved cephalad when viewed laterally.

The chief character separating these specimens from the spcies to which it seems to be very closely allied is the female cauda which terminates in a subacute tip, as shown in Fig. 352. There is a distinct downward curve of the distal portion of the upper plate.

Trioza forcipula sp. nov.

This species, like *dubia*, is apparently closely allied to *maura*. The head (Fig. 338) with moderately long dark cones subacute at tip, and the wings (Fig. 317) are especially like those of that species. Wing length about 2.75 mm. The female cauda (Fig. 355) is distinctive, both upper and lower plates being rather broad and elongate. The upper plate has a downward curve. The male (Figs. 342 and 350) has the forceps strongly bowed in caudal aspect with tip ending rather bluntly and highly chitinized. The inner surface is supplied with long but not comparatively heavy setæ, the terminal group, however, are stiff and approximate.

Lot 1339 Sub 21. One female with data "Ithaca, N. Y. 16 May 1900."

Lot 1347 Sub 22. One male and one female with data "Hull, Ottawa, Ont. 17-V-1903, W. Metcalfe." Two males with data "Hull, Ottawa, Ont. 26-VII-1903, W. Metcalfe." One female with data "Ottawa, Ont. 17-V-1903, W. Metcalfe." One female with data. "Ottawa, Ont. 29-V-1904, W. Metcalfe." One female with data, "Elm, Ottawa, Ont. 5-VI-1904, W. Metcalfe."

Lot 1348 Sub 72. Seven specimens with data "Ft. Collins, Col. 5-12-99, E. D. Ball."

Trioza longistylus Crawford.

This species is closely allied to *collaris* and in some characters hardly to be distinguished from it.

Figs. 320 and 361 show the wing and female cauda. The wing of specimens at hand is about 3.45 mm long.

The forceps of the male cauda are from the lateral aspect, long and slender and rather strongly curved cephalad. On the inner surface are two longitudinal ridges, one bearing relatively few pointed setæ and the other thickly set with several irregular rows of large flat blade-like setæ.

Lot 1339 Sub 14. One female with data "S. Francisco dunes, Cal. Nov. 11, 1907, Bradley."

Lot 1339 Sub 15. Two males and one female with data "Felton, St. Cruz Mts., Cal. 15-19, May, '07. 300-500 ft. Bradley."

Lot 1339 Sub 16. One female with data "Blue Lake, Hmbldt Co., Cal. July 20-27, 1907, Bradley."

LITERATURE.

1910 Crawford, D. L. American Psyllidae I, p. 233.
1911 Crawford, D. L. American Psyllidae III, p. 434.

Trioza marginata Crawford.

The head and female cauda of this species come exceedingly close to *T. maura*. The length of branches of M and Cu are different and a smoky caudal margin of the wing further characterizes this species. The wing specimen at hand is 2.85 mm long. Figs. 321, 332, and 360.

Lot 1348 Sub 75. Two females with data "Ariz. 2217. 5-20-96. Tuscon, Ariz. R. E. Kinze."

LITERATURE.

1910 Crawford, D. L. American Psyllidae I, p. 232.
1910 Crawford, D. L. American Psyllidae II, p. 356.

Trioza maura Foerster?

Twelve collections are either *maura* Foerster as figured by Sulc 1911 or remarkably close to that species. Included here are pale specimens with white faces and cones which are easily separated from black coned specimens in the collection by color characters, but as they show no specific structural differences I am of the opinion that the paler individuals are teneral and that the darker ones are those with a more mature coloring.

Wing measures about 2.85 mm in length. Figs. 322, 323, 337, 349, 351, 359. Fig. 322 is a wing taken from a specimen with black cones and Fig. 323 from one with white cones.

Lot 1339 Sub 18. One female with data "Mesa Grande Russian R. Cal. 30 Sept. '06. J. C. Bradley."

Lot. 1339 Sub 20. One female with data "Algonquin, Ill. 12 July 1895."

Lot 1348 Sub 38. Six specimens with data "Colo. 2220. 8-6-96. Ft. Collins C. P. G. Caught flying around light." Five specimens with data "Colo. 2199. 7-8-96. Larimer Co. C. P. G."

Lot 1348 Sub 76. Two females with data "Colo. 1680. *Trioza striola* Foerster." One female with data "Colo. 1681. 7-13-94. Steamboat Springs. C. F. Baker. On willow."

Lot 1348 Sub 77. One specimen with data "det. C. V. R. Colo. 1733. 7-12-94. C. P. G. Estes Park. Colo."

Lot 1348 Sub 78. Eight specimens with data "Colo. 2176. 7-18-96 Denver, C. P. G."

Lot 1348 Sub 79. Five specimens with data "Colo. 2173. 7-18-96. Denver, Colo. C. P. G. On willow. *Trioza* near *albiventris*." The facial cones of this lot were white.

Lot 1348 Sub 80. Two specimens with data "Colo. 2173. 7-18-96 Denver, Colo. C. P. G. On willow." The face and facial cones of this lot were black.

Lot 1348 Sub 81. Seven specimens with data "Colo. 2785. 9-25-97. New Windsor, Colo. C. P. G. Taken in sweeping wet ground." Cones and face black in this lot.

Lot 1348 Sub 82. Two specimens with data "Colo. 2785. 9-25-97 New Windsor, Colo. C. P. G. Taken in sweeping ground." Cones white.

Lot 1348 Sub 83. Seven specimens with data "Colo. 2767. 8-15-97 Ft. Collins, C. P. G. On willow." Jet black head, and dorsal thorax.

LITERATURE.

1911 Sulc, Dr. Karel. Monographia Generis Trioza Foerster. Part II, p. 10.

Trioza quadripunctata Crawford.

Photographs of this species are given in Figs. 324, 333, 347, and 353. The most striking feature is the heavy maculation of the wing at the three marginal dashes and at tip of clavus. As the species is pale in color these dark spots are particularly conspicuous. The cephalic margin of wing is strongly bowed. The wing of specimen at hand is about 2.25 mm long.

Lot 1342 Sub 3. Four specimens (male and female) given me by Mr. J. J. Davis with data "Ft. Collins, Colo. 11, Nov. 1910 collected from common nettle *Urtica*, by Prof. C. P. Gillette."

Lot 1348 Sub 21. Six specimens with data "Boulder."

Lot 1348 Sub 71. One specimen with data "Ft. Collins, Col. 5-12-99, C. D. Ball."

Lot 1348 Sub 86. One specimen with data "Colo. 2248. 8-12-96. Palmer Lake, Colo. C. P. G.

Lot 1348 Sub 88. Probably this species, though dashes are not as heavy as usual. One female with data "Colo. 2220. 8-6-96 Ft. Collins. C. P. G. caught flying around light."

LITERATURE.

1910 Crawford, D. L. American Psyllidae I, p. 233.
1911 Crawford, D. L. American Psyllidae III, p. 433.

Trioza stylifera sp. nov.

The yellow wing of this species is broadly and bluntly rounded and the heavy veins of an ordinary *Trioza* type of branching as shown in Fig. 325. It measures about 2.4 mm in length. The cones are moderately long and rather bluntly pointed, and divergent. The cuticular thickenings of the frontal plates from the middle ocellus to eye are flat and scale-like (Figs. 344 and 335). The female cauda (Fig. 356) is relatively long and acutely pointed. The upper plate extends a bit beyond the ovipositor and is slender at tip. The male cauda is characterized by the peculiar forceps, the distal part of each arm being broad, thick, hollowed, and hood-shaped. This aspect is shown in Fig. 362.

Lot 1347 Sub 20. Six specimens with data "Brockville, Ont. W. Metcalfe. Oct. 25, 1903; Oct. 29. 1903; Nov. 1. 1903; Nov. 15. 1903."

Lot 1348 Sub 85. One female without data.

Trioza tripunctata (Fitch).

This beautiful species has attracted some attention on account of its conspicuous occurrence on blackberry bushes. Photographs of the head and wing are given in Figs. 326 and 336. The wing is about 3 mm long.

Lot 1342 Sub 2. Nymphs and pupæ pellucid and yellowish. Head and prothorax deeper yellow than other parts. Eyes dark red. Mesothorax and metathorax sometimes clear pale green. Wing pads and abdomen pale. In flocculent white fluff on ventral surface of blackberry leaf. Collection at Orono, Maine, Aug. 31, 1911, comprised both nymphs and imagoes.

Lot 1342 Sub 4. Pupæ and imagoes collected at Sebago Lake, Maine, Aug. 19, 1904, from wild blackberry bushes.

Lot 1339 Subs 1 and 2. Two named specimens received from Doctor Felt with data "Lot 125. Karner, N. Y. April 15. 1902. N. Y. S. Coll."

Lot 1339 Sub 13. Specimens with data "Adiron. Mts. Axton. N. Y. 12-22 June. 1901. Cornell U. Lot. 235 Sub 34." Nineteen pinned specimens with data "Sea Cliff, L. I."

Lot 1339 Sub 41. One specimen with data "Uhler Nov. 77. D. C. on Pine, Mar. 16, '73. Cornell U. Lot 62. Collected by Theo. Pergande in D. C. and determined by Uhler. Given J. H. C. by Pergande."

LITERATURE.

1851	Fitch, Asa. Catalogue *Psylla tripunctata.*
1869	Walsh and Riley. Am. Ent. Vol. 1. p. 225. *Psylla rubi.*
1879	Thomas, C. 3rd Rept. p. 17 account after Walsh and Riley.
1880	Fuller, A. S. Am. Ent. Vol. 3, p. 62. *Psylla rubi.*
1880	Riley, C. V. Am. Ent. Vol. 3, p. 62. foot note. *Psylla tripunctata* Fitch (*P. rubi.*)

1884 Riley, C. V. Pro. Biol. Soc. Wash. Vol. 2. *Trioza tripunctata* Fitch (*rubi* Walsh and Riley.)
1890 Packard, A. S. Forest Insects, p. 805. Reference to Riley (1880).
1894 ('95) Mally, Proc. Iowa Acad. Sc. Vol. 2, p. 154. *Trioza tripunctata* (*Phylloplecta tripunctata?*)
1900 Lugger, Otto. Report p. 141. Mention.
1909 ('10) Smith, J. B. Insects of New Jersey, p. 110. Listed.
1910 Crawford, D. L. American Psyllidae I, pp. 231 and 232.
1911 Crawford, D. L. American Psyllidae III, p. 430.

Allotrioza arbolensis (Crawford).

Lot 1348 Sub 16. Three specimens with data "Colo. 2294. 8-22-96 Cimarron, Colo.," I think to be *arbolensis*.. Figs. 327 and 339. The wing measures 3.4 mm.

LITERATURE.

1911 Crawford, D. L. American Psyllidae III, p. 444.

Neotriozella ottawanensis sp. nov.

A species with wings like *laticeps* Crawford and cones like *immaculata* Crawford and evidently exceedingly close to those species. Thorax red in pinned specimens and narrower than head with eyes. Long slender tapering cones not divergent in pinned specimens but approximate to tip. They spread by pressure in balsam mounts (Fig. 341). The female cauda (Fig. 354) is long and tapering at distal end. The upper plate extends beyond other parts. The male forceps (Fig. 348) have clavate arms blunt at distal part. The wing (Fig. 328) measures 2.5 mm in length.

Paratrioza cockerelli (Sulc).

This species has been well described and figured by Sulc, and is receiving economic attention in Colorado. Figures of head and wing 329 and 340 are given here with accession numbers of the material at hand merely by way of including this species.

Lot 1348 Sub 5. Specimens with data "Ft. Collins, Col. 7-30-06 Potatoes," "Ft. Collins, Col. 10-2-06 Potatoes. Collected by S. A. Johnson," "Ft. Collins, Col. 3-24-09 Pepper. Breeding Cage A."

Lot 1348 Sub 23. Thirteen specimens with data "Colo. 2256," three specimens with data "Colo. 2786," one specimen with data "Colo. 2787."

LITERATURE.

1909 Sulc, Dr. Karel. Casopisu (Ceske) Spolecosti Entomologicke, p. 102. *Trioza cockerelli.*

1911 Crawford, D. L. American Psyllidae III, p. 448. *Paratrioza cockerelli.*

1911 Johnson, S. Arthur. News Notes. The Tomato Psyllid.

EXPLANATION OF FIGURES.

The photomicrographs were taken by Mr. Royden Hammond from balsam mounts prepared for study. The frontal cones are in some cases spread apart more in these mounts than in pinned specimens or in life; and, as is evident enough, in order to bring the cones into correct focus, the occipital aspect is sometimes brought into view where the preparation is particularly transparent.

Fig. 316. Trioza aylmeriae. Fig. 317. T. forcipula. Fig. 318. T. diospyri. Fig. 319. T. dubia. Fig. 320. T. longistylus. Fig. 321. T. marginata. Figs. 322 and 323. T. maura? Fig. 324. T. quadripunctata. Fig. 325. T. stylifera. Fig. 326. T. tripunctata. Fig. 327. Allotrioza arbolensis. Fig. 328. Neotriozella ottawanensis. Fig. 329. Paratrioza cockerelli.

Fig. 330. Trioza aylmeriae. Fig. 331. T. diospyri. Fig. 332. T. marginata. Fig. 333. T. quadripunctata. Figs 334 and 335. T. stylifera. Fig. 336. T. tripunctata. Fig. 337. T. maura? Fig. 338. T. forcipula. Fig. 339. Allotrioza arbolensis. Fig. 340. Paratrioza cockerelli. Fig. 341. Neotriozella ottawanensis.

Fig. 342. Trioza forcipula. Figs. 343-346. T. aylmeriae. Fig. 347. T. quadripunctata. Fig. 348. N. ottawanensis. Fig. 349. T. maura? Fig. 350. T. forcipula. Fig. 351. T. maura? Fig. 352. T. dubia. Fig. 353. T. quadripunctata. Fig. 354. N. ottawanensis. Fig. 355. T. forcipula. Fig. 356. T. stylifera. Fig. 357. T. diospyri. Fig. 358. T. collaris. Fig. 359. T. maura? Fig. 360. T. marginata. Fig. 361. T. longistylus. Fig. 362. T. stylifera.

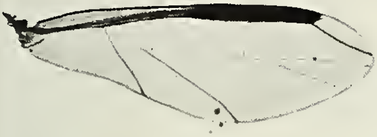
Fig. 363, A. artemisiae angustipennis, Lot 1348-41; Fig. 364, A. calthae? Lot 1348-53; Fig. 365, A. communis, 1348-39b; Fig. 366, A. fascipennis, Lot 1339-24; Fig. 367, A. sp., Lot 1347-39; Fig. 368, A. nebulosa americana, Lot 1348-65; Fig. 369, A. nubifera, Lot 1348-48; Fig. 370, A. polygoni, Lot 1341-7; Fig. 371, A. sp., Lot 1347-38; Fig. 372, A. rumicis, Lot 1341-6; Fig. 373, A. sp., Lot 1347-39; Fig. 374, A. communis, Lot 1347-37; Figs. 375 and 376, A. angustipennis, Lot 1347-24; Fig. 377, A. rumicis, Lot 1341-6; Fig. 378, A. calthae? Lot 1348-53; Fig. 379, A. polygoni, Lot 1341-7; Fig. 380, A. picta, Lot 1348-29. Fig. 381, A. sp., Lot 1347-39; Fig. 382, A. calthae? Lot 1348-53; Fig. 383, A. polygoni, Lot 1341-7; Fig. 384, A. calthae? Lot 1348-47; Fig. 385, A. nebulosa americana, Lot 1348-65; Fig. 386, A. angustipennis, Lot 1348-41; Fig. 387, A. polygoni, Lot 1341-7; Fig. 388, A. picta, Lot 1348-29; Fig. 389, A. communis, Lot 1347-32b; Fig. 390, A. sp., Lot 1347-38.

Fig. 391, Psylla coryli, Lot 1348-61; Fig. 392, P. ribis, Lot 1348-25; Fig. 393, P. negundinis, Lot 1348-11; Fig. 394, P. hartigii, Lot 1340-2; Fig. 395, P. annulata, Lot 1345-2; Fig. 396, P. gilletti, Lot 1348-20; Fig. 397, P. breviata, Lot 1347-36; Fig. 398, P. pyricola, Lot 1326-4; Fig.

399, P. brevistigmata, Lot 1339-31; Fig. 400, P. cerasi, Lot 1341-4; Fig. 401, Pachypsylla mammae, Lot 1339-53; Fig. 402, P. tridentata, Lot 1339-40; Fig. 403, P. pallida, Lot 1339-51; Fig. 404, P. dubia, Lot 1339-56.

Fig. 405, Psylla breviata; Fig. 406, P. coryli; Fig. 407, P. ribis; Fig. 408, P. hartigii; Fig. 409, P. negundinis; Fig. 410, P. pallida; Fig. 411, P. annulata; Fig. 412, P. cerasi; Fig. 413, P. brevistigmata; Fig. 414, P. gilletti; Fig. 415, Pachypsylla tridentata; Fig. 416, Pachypsylla dubia; Fig. 417. Psylla ribis; Fig. 418, Pachypsylla tridentata; Fig. 419, Psylla coryli; Fig. 420. P. negundinis; Fig. 421, P. annulata; Fig. 422, P. gilletti; Fig. 423, P. hartigii.

Fig. 424, Psylla breviata; Fig. 425, Pachypsylla tridentata; Fig. 426, Pachypsylla dubia; Fig. 427, Pachypsylla brevistigmata; Fig. 428, Psylla gilletti; Fig. 429, P. hartigii; Fig. 430, P. ribis; Fig. 431, P. cerasi; Figs. 432 and 433, P. hartigii; Fig. 434, P. pyricola; Figs. 435 and 436, Pachypsylla dubia: Fig. 437, P. tridentata.



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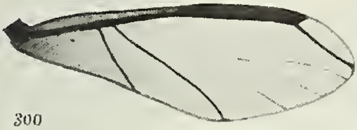

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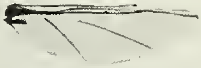

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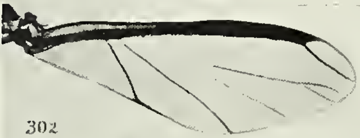

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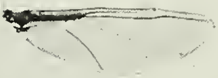

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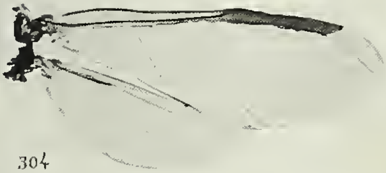

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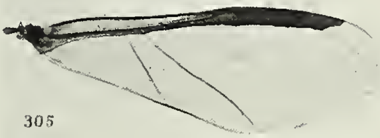

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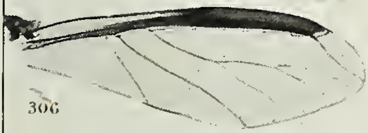

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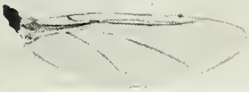

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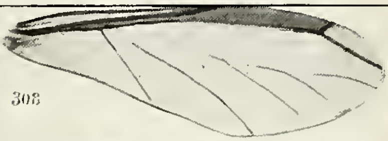

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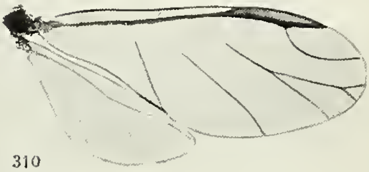

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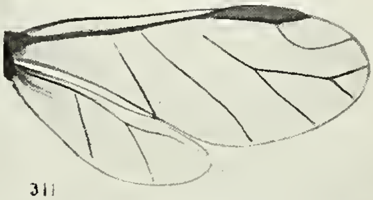

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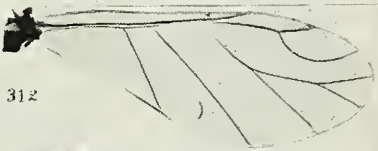

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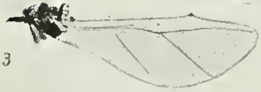

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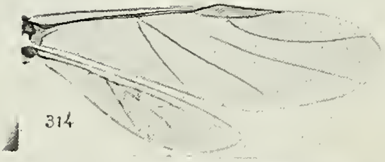

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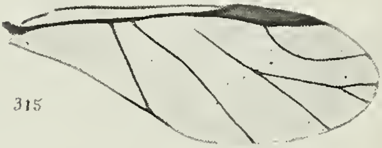

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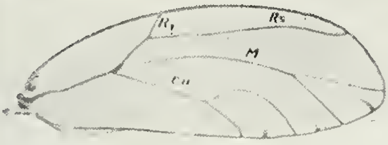

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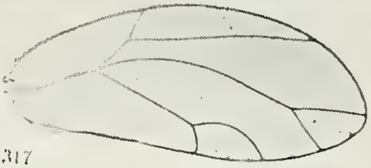

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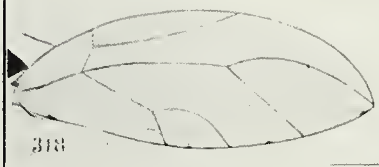

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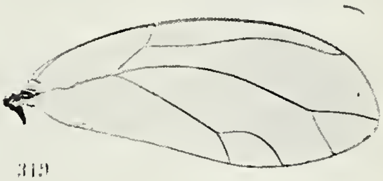

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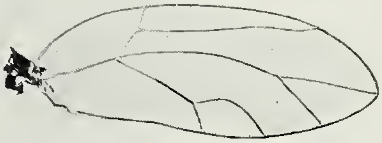

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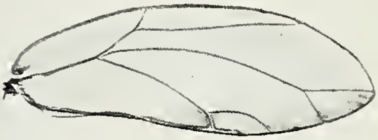

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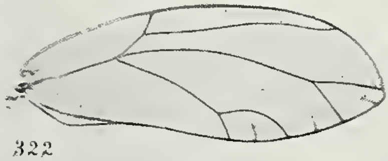

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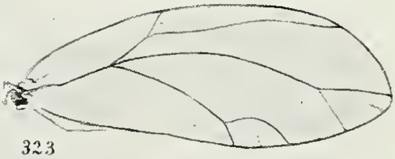

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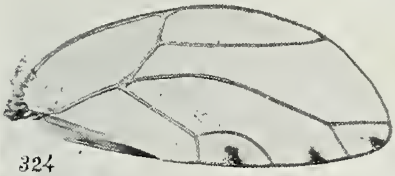

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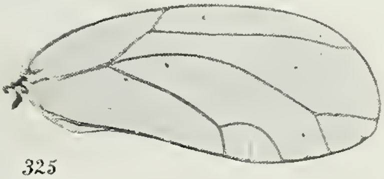

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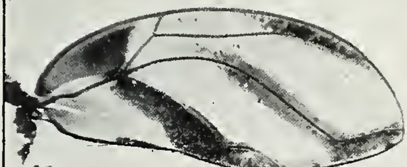

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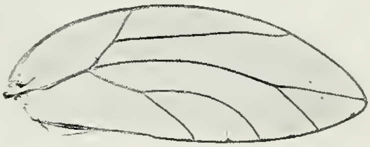

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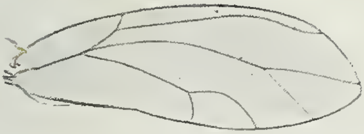

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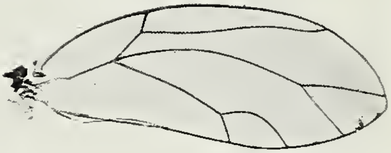

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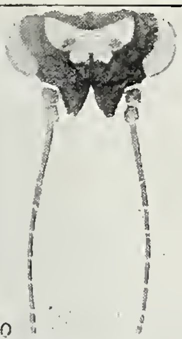
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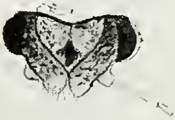
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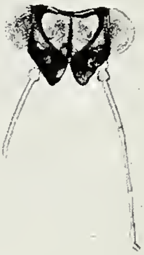
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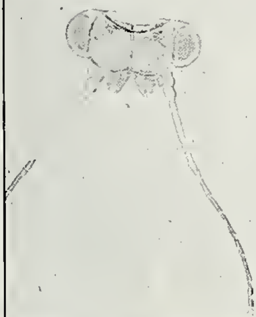
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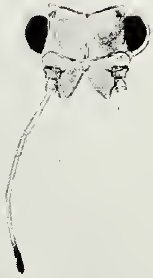
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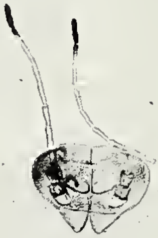
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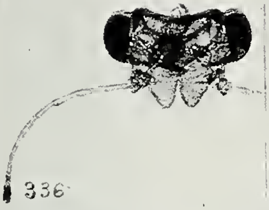
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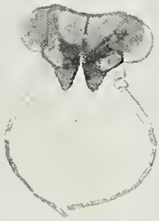
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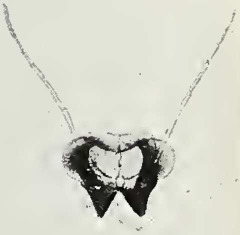
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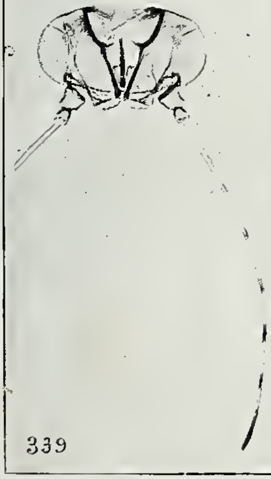
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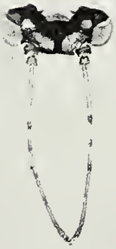
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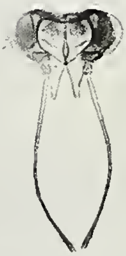
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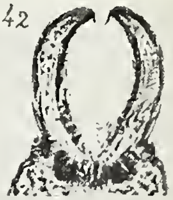

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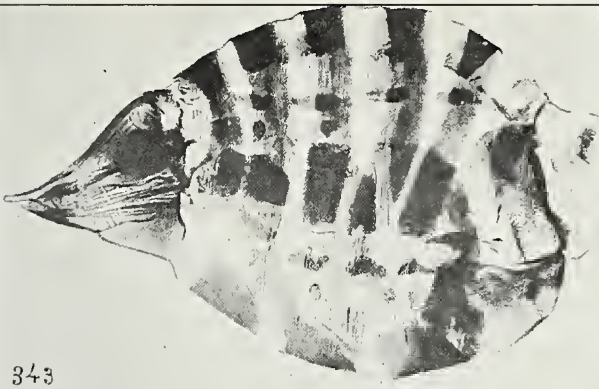

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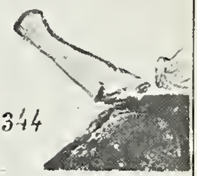

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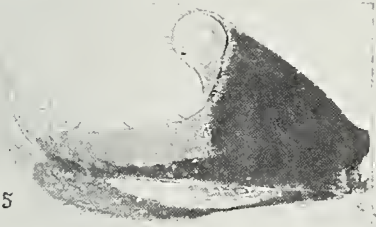

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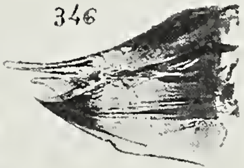

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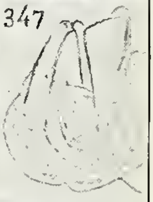

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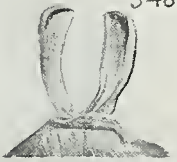

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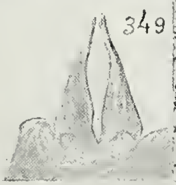

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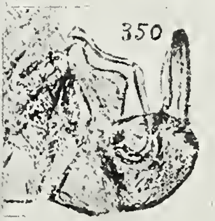

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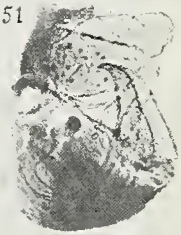

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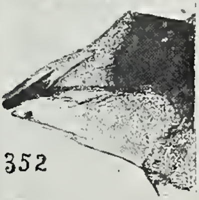

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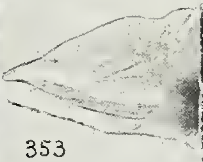

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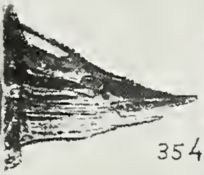

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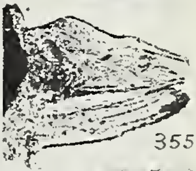

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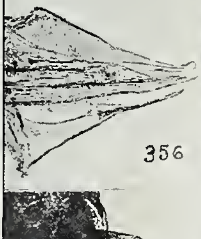

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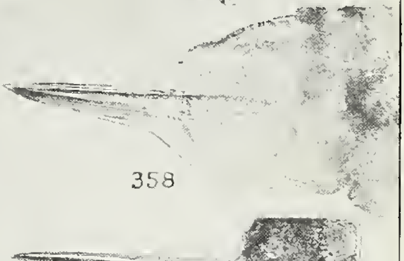

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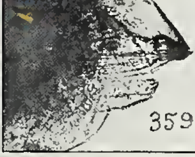

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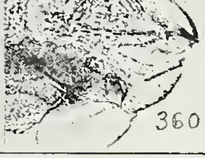

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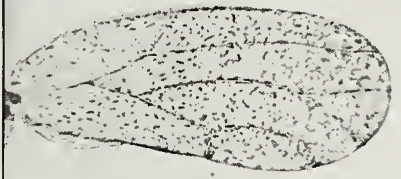

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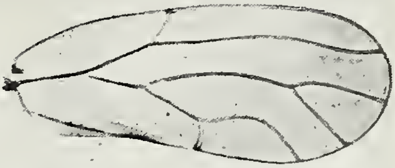

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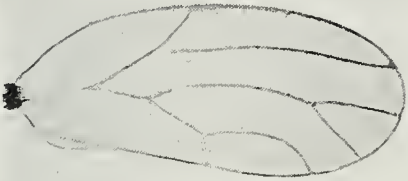

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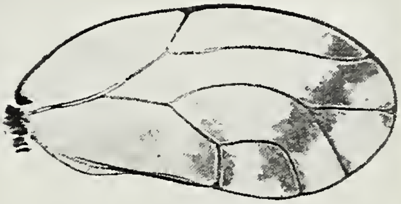

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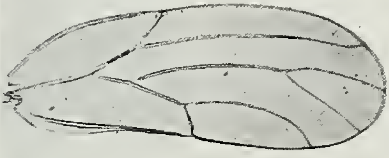

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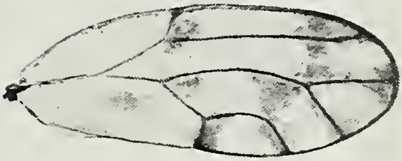

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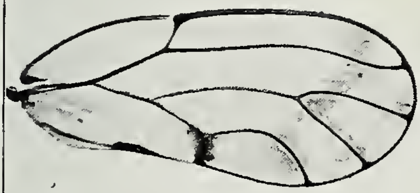

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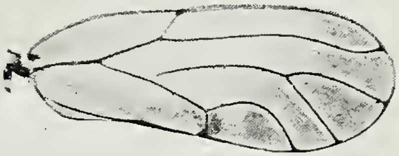

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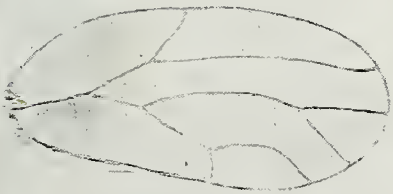

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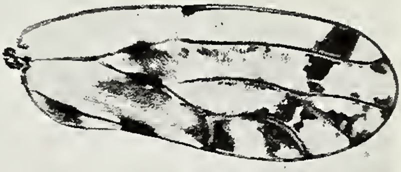

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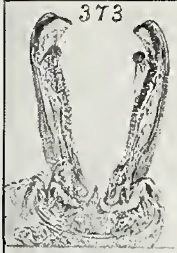
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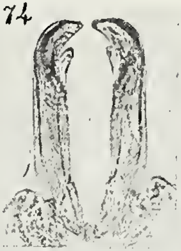
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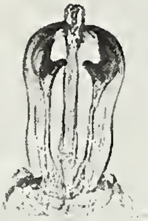
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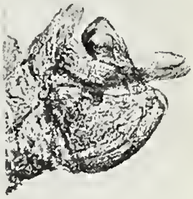
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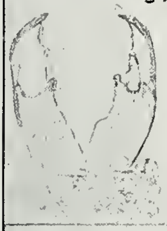
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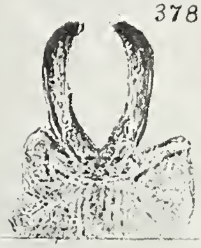
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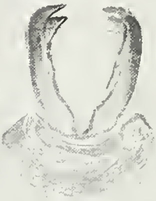
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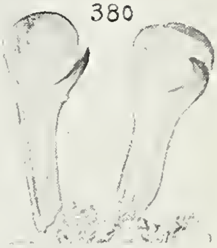
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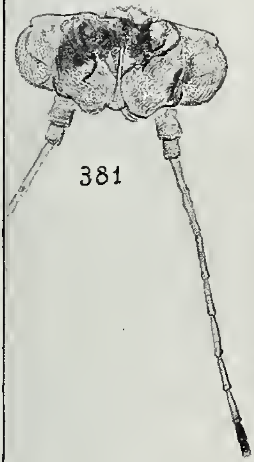
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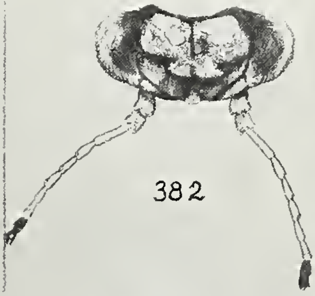
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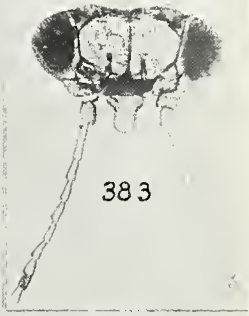
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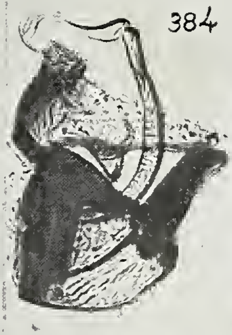
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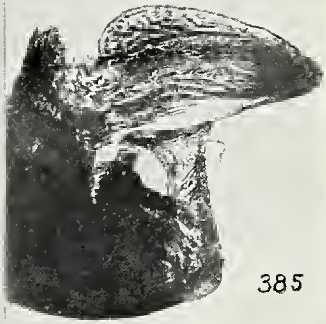
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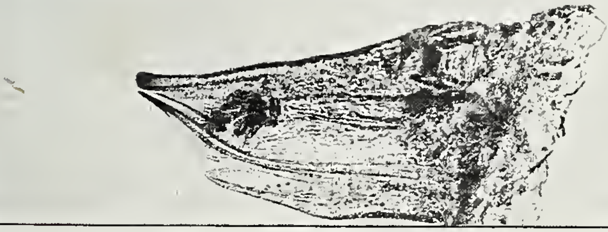
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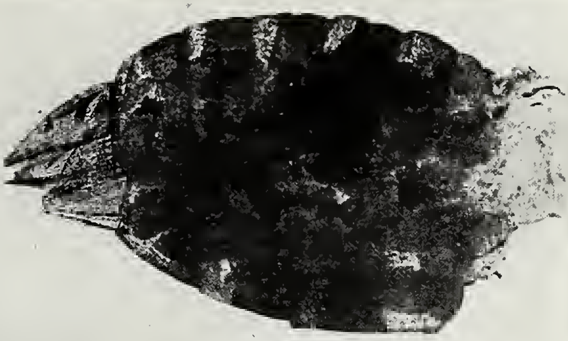

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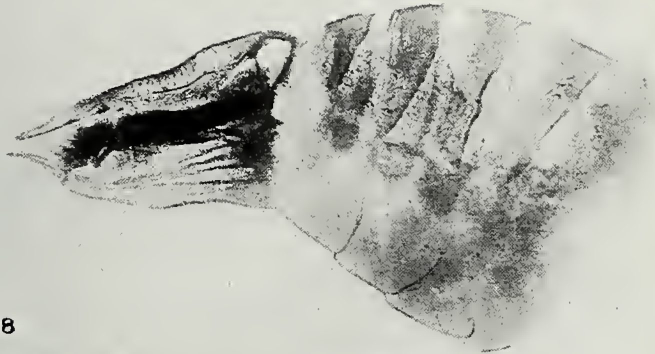

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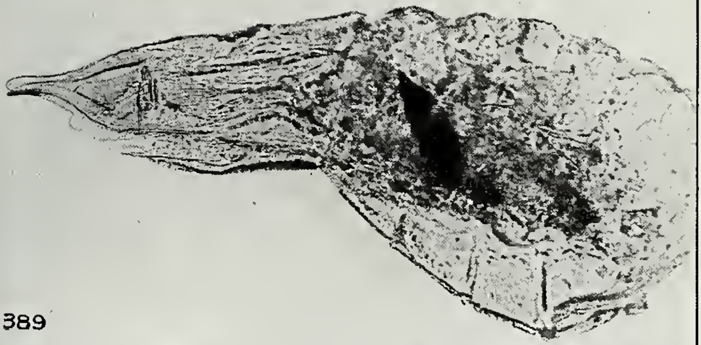

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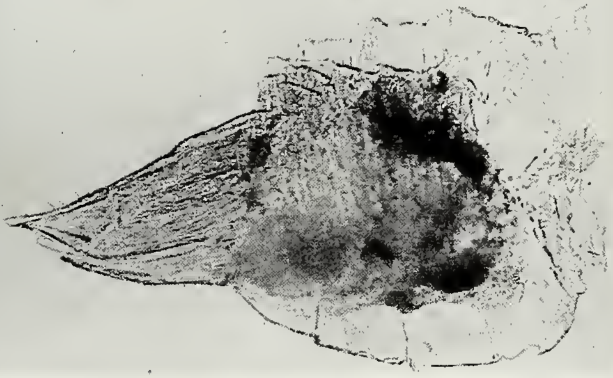

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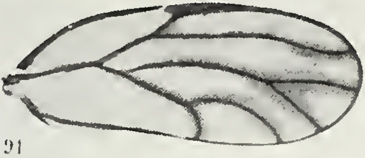
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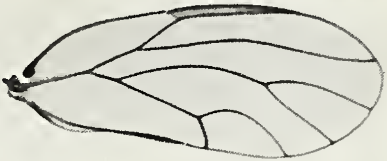
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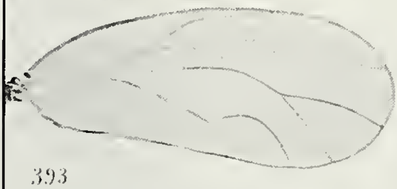
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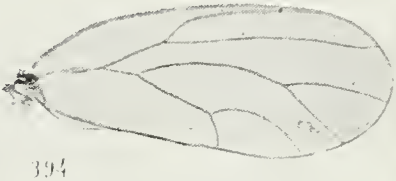
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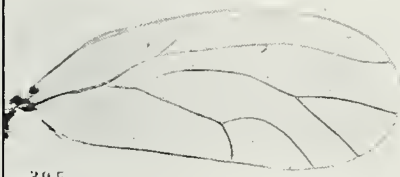
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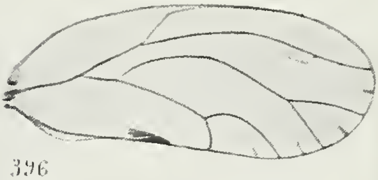
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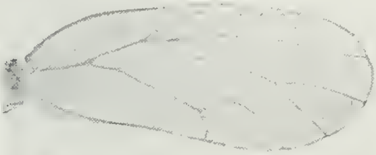
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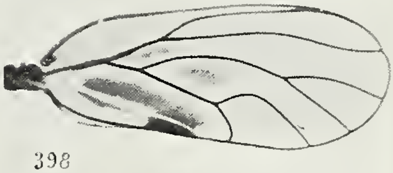
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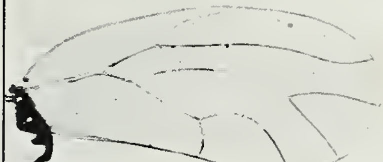
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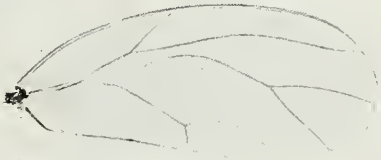
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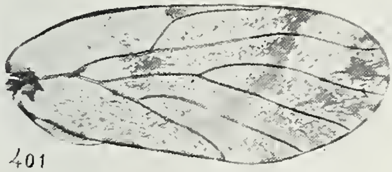
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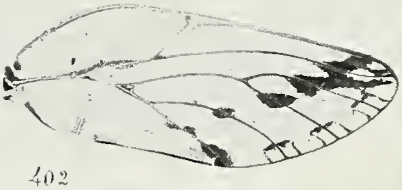
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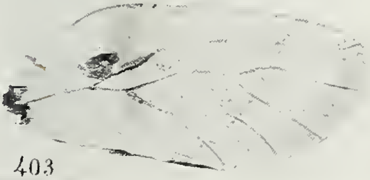
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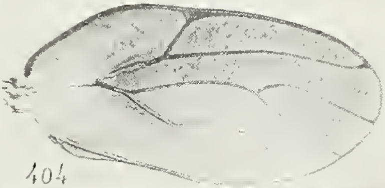
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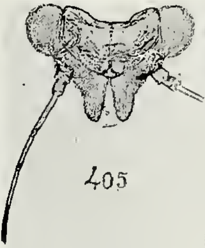

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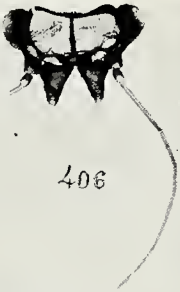

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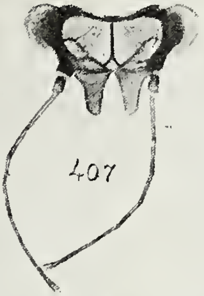

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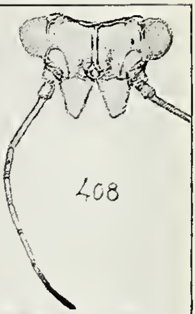

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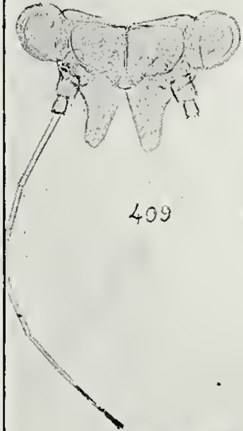

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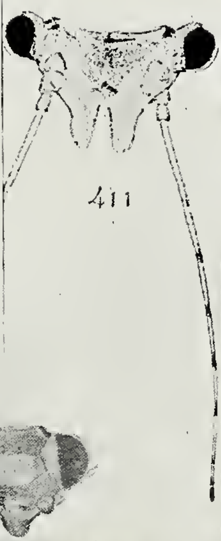

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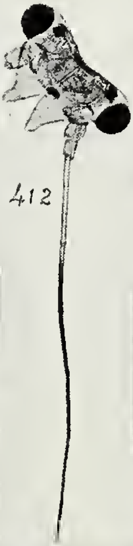

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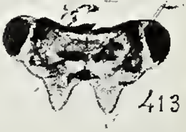

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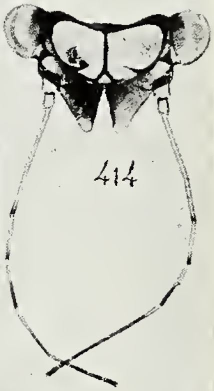

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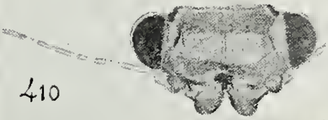

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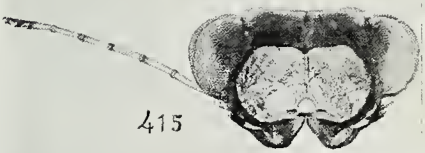

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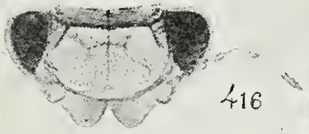

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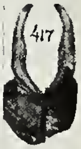

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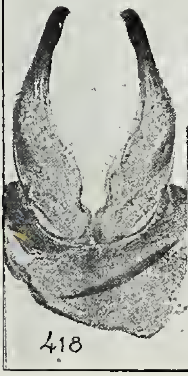

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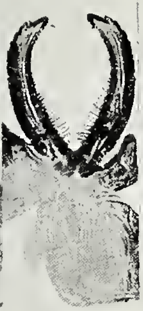

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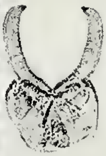

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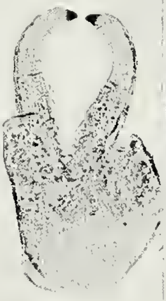

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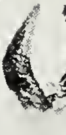

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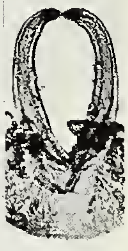

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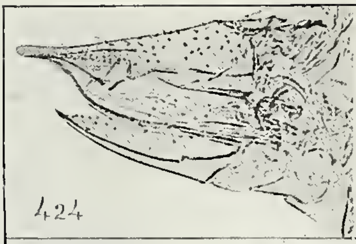
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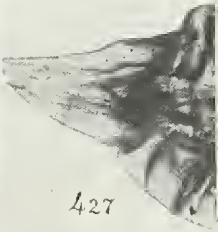
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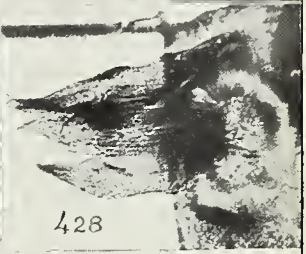
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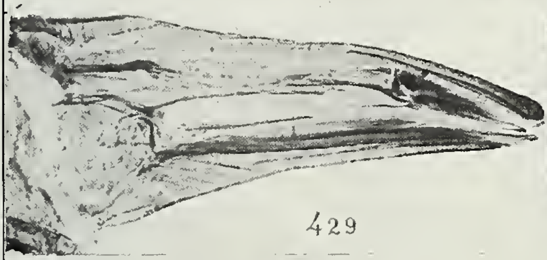
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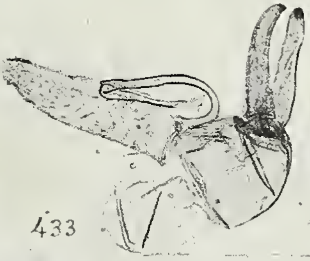
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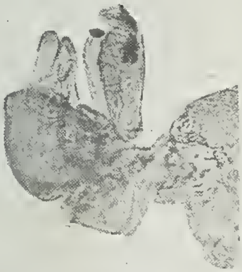
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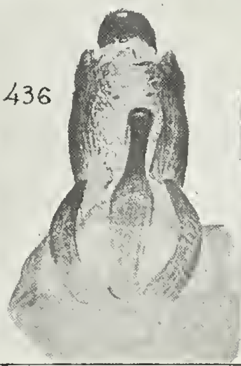
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